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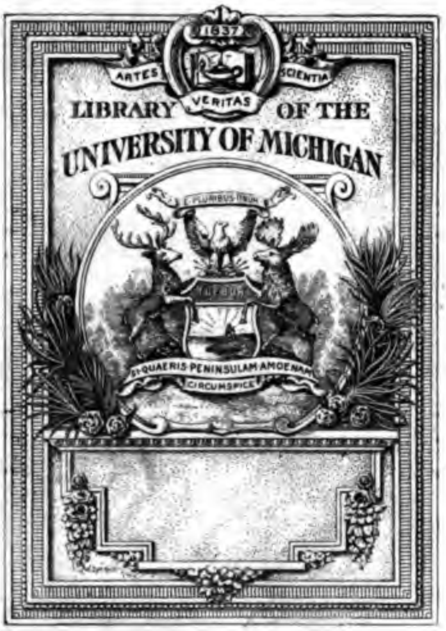

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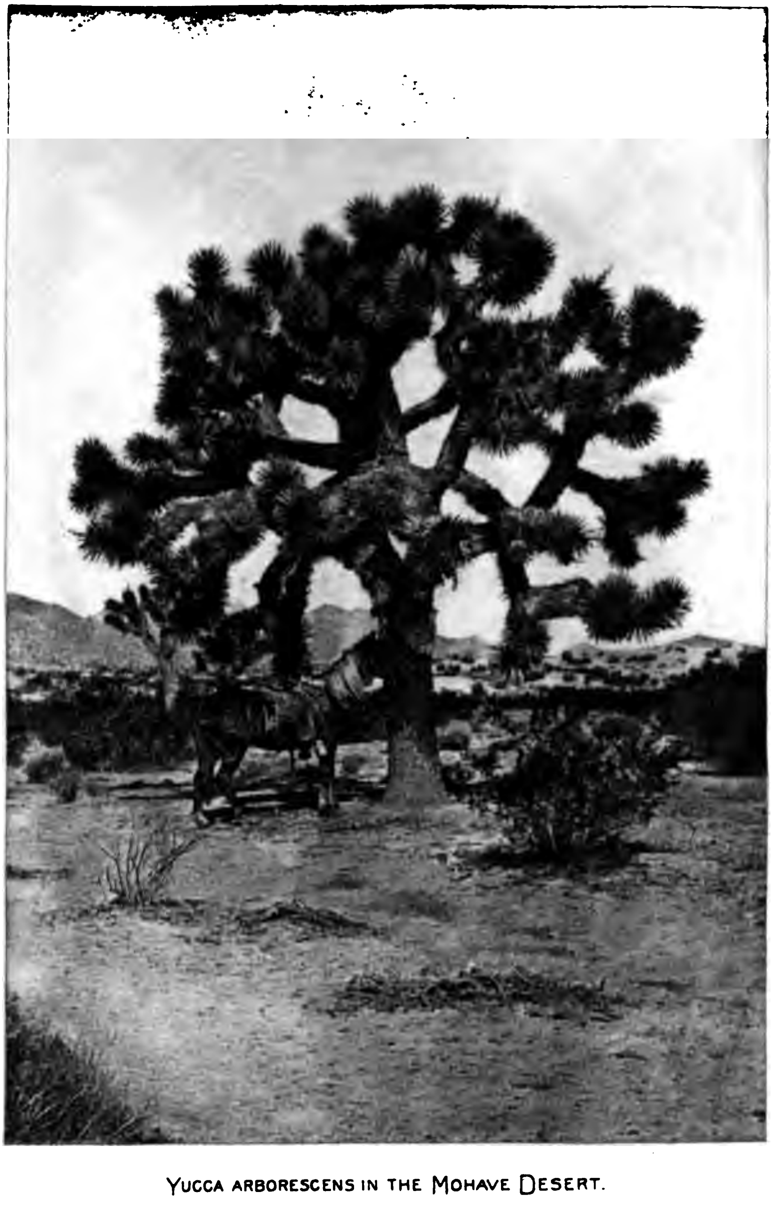

YUCCA ARBORESCENS IN THE MOHAVE DESERT.

U. S. DEPARTMENT OF AGRICULTURE.
DIVISION OF BOTANY.

# CONTRIBUTIONS
FROM
THE U. S. NATIONAL HERBARIUM.

Vol. IV.

ISSUED NOVEMBER 29, 1893.

BOTANY OF THE DEATH VALLEY EXPEDITION.

A REPORT ON THE BOTANY OF THE EXPEDITION SENT OUT
IN 1891 BY THE U. S. DEPARTMENT OF AGRICULTURE
TO MAKE A BIOLOGICAL SURVEY OF THE REGION
OF DEATH VALLEY, CALIFORNIA.

BY

FREDERICK VERNON COVILLE,
Botanist of the Death Valley Expedition.

PUBLISHED BY AUTHORITY OF THE SECRETARY OF AGRICULTURE.

WASHINGTON:
GOVERNMENT PRINTING OFFICE
1893.

NOTE.

The following publications relating to the botany of the Death Valley Expedition have already been issued:

Descriptions of new plants from southern California, Nevada, Utah, and Arizona. By Frederick Vernon Coville. <Proceedings of the Biological Society of Washington, Vol. VII, pp. 65–80, May 18, 1892.

The Panamint Indians of California. By Frederick Vernon Coville. <The American Anthropologist, Vol. V, pp. 351–361, October, 1892.

Sketch of the flora of Death Valley, California. By Frederick Vernon Coville. <Science, Vol. XX, pp. 342, 343, December 16, 1892.

Notes on the distribution of trees and shrubs in the deserts and desert ranges of southern California, southern Nevada, northwestern Arizona, and southwestern Utah. By C. Hart Merriam. <North American Fauna, No. 7. pp. 285–343, May 31, 1893.

Notes on the geographic and vertical distribution of Cactuses, Yuccas, and Agave, in the deserts and desert ranges of southern California, southern Nevada, northwestern Arizona, and southwestern Utah. By C. Hart Merriam. <North American Fauna, No. 7, pp. 345–359, with Plates VII to XIX, May 31, 1893.

LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF BOTANY,
Washington, D. C., December 31, 1892.

SIR: I have the honor of transmitting the report of Mr. F. V. Coville, Assistant Botanist, on the botany of the Death Valley Expedition, for publication as Vol. IV. of Contributions from the U. S. National Herbarium.

Respectfully,

GEORGE VASEY,
Botanist.

Hon. J. M. RUSK,
Secretary of Agriculture.

262967

LETTER OF SUBMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF BOTANY,
Washington, D. C., December 24, 1892.

SIR: I have the honor to submit for your consideration the manuscript of my report as botanist of the Death Valley Expedition of 1891.

Respectfully,

FREDERICK V. COVILLE.

Dr. GEORGE VASEY,
Botanist, U. S. Department of Agriculture.

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BOTANY OF THE DEATH VALLEY EXPEDITION.

By Frederick Vernon Coville.

PREFATORY NOTE.

In 1886 and subsequent years appropriation was made by Congress for a study of the geographic distribution of animals, to be conducted by the Division of Ornithology and Mammalogy, United States Department of Agriculture. In the year 1890 the scope of the work was enlarged by act of Congress so as to include the distribution of plants as well as animals, and in accordance with this provision the writer was temporarily detailed from the Division of Botany as botanist of the Death Valley Expedition, the first of the biological surveys under the new act. The work was planned and conducted under the direction of Dr. C. Hart Merriam, chief of the Division of Ornithology and Mammalogy. The botanical work undertaken by the writer was to collect and identify the plants of the region traversed by the expedition, to collate those data which had reference to the range of species, and to arrange this accumulated material in such form that it would be useful in studying the facts and problems of geographic distribution. The subject-matter of the report is presented under the following heads:

(1) Itinerary—a record of the writer's location each day after leaving San Bernardino, with a few references to those prominent features of the route which are of especial botanical interest.

(2) Principles of plant distribution—an enumeration of the main conditions influencing distribution, and an attempt to reduce these conditions to their simplest factors.

(3) Distribution of plants in southeastern California—an analysis of the flora of that region into its smaller component floras, and a consideration of their relation to each other and to the floras of adjacent parts of the country.

(4) Characteristics and adaptations of the desert flora—a statement of the environmental conditions of the Death Valley desert region, and a discussion of the resultant adaptive modifications of the flora.

(5) Catalogue of species—a systematically arranged catalogue of the plants collected by the expedition. For the sake of convenience, the sequence of orders in Durand's Index Generum Phanerogamorum has been adopted. In the matter of nomenclature, the principles recommended by the Botanical Club of the American Association for the Advancement of Science, at the Rochester meeting of 1892, have been followed. In the study of systematic botany from the standpoint of geographic distribution, an item of great importance is the place from which came the type specimen of a species. A literatim copy of the published statement of locality has been given whenever the work that contained it could be examined.

(6) Catalogue of specimens—a list of the specimens collected by the expedition, arranged consecutively by numbers. This catalogue is almost indispensable for reference in connection with the catalogue of species, since it contains additional data arranged nearly in chronological order.

(7) Bibliography—prepared under the writer's direction by Miss Josephine A. Clark. This is a list of books to which reference is made in the catalogue of species, and which, except those marked by an asterisk, have been actually consulted in the preparation of the report.

Acknowledgments are due to many who have aided in the preparation of this report, materially hastening its completion and adding to its value. The members of the expedition have all contributed to the success of its botanical work, both by furnishing data and by collecting specimens. Among those not directly connected with the botanical corps, Dr. C. Hart Merriam, Mr. T. S. Palmer, Mr. Vernon Bailey, and Mr. F. W. Koch have rendered important assistance in supplying material and information. Certain groups of plants have been submitted to various authorities for identification: *Delphinium* to Dr. B. L. Robinson; several Cruciferæ to the late Dr. Sereno Watson; *Astragalus* to Mr. E. P. Sheldon; a part of *Potentilla* to Dr. Hans Siegfried; a few species of *Epilobium* to Dr. William Trelease; the Umbelliferæ to Dr. J. N. Rose; a part of *Eriogonum* to Mr. W. M. Canby; *Salix* to Mr. M. S. Bebb; *Carex* to Prof. L. H. Bailey; the Gramineæ to the late Dr. George Vasey; the Filices to Prof. D. C. Eaton; the other Pteridophyta and the Hepaticæ to Prof. L. M. Underwood; the Musci to Mr. J. M. Holzinger; the Fungi to Miss May Varney and Mr. J. B. Ellis; the Characeæ to Dr. T. F. Allen; and some of the Algæ to Dr. W. G. Farlow.

Among the curators or owners of American herbaria to whom thanks are due, either for the loan of types or for the critical comparison of uncertain specimens, are Mrs. Katharine Brandegee, Mr. S. B. Parish, Dr. William Trelease, Mr. H. E. Seaton, Dr. N. L. Britton, Mr. J. H. Redfield, Mr. W. M. Canby, and Dr. Casimir de Candolle. The writer spent two weeks at the Harvard University Herbarium, the rich facilities of which, through the kindness of the curator, Dr. B. L.

Robinson, were placed at his disposal. To Prof. E. L. Greene, whose scholarly and critical knowledge of the flora of western California has assisted in settling many difficult questions, are tendered most grateful thanks. To these and to others upon whose authority identifications or statements are published in the report, acknowledgment is made in the proper places in the text.

The metric system of linear measurements has been used throughout the report, the itinerary excepted. To those not familiar with this system, the following table, from "Tables for converting customary and metric weights and measures," published by the U. S. Coast and Geodetic Survey in 1890, will be useful. The measure called a line, which has been in common use among botanists, is one-twelfth of an inch and therefore nearly equal to 2 millimeters.

Table for converting English and metric linear measures.

	Inches to millimeters.	Feet to meters.	Miles to kilometers.	Meters to inches.	Meters to feet.	Kilometers to miles.
1 =	25.4000	0.304801	1.60935	39.3700	3.28083	0.62137
2 =	50.8001	0.609601	3.21869	78.7400	6.56167	1.24274
3 =	76.2001	0.914402	4.82804	118.1100	9.84250	1.86411
4 =	101.6002	1.219202	6.43739	157.4800	13.12333	2.48548
5 =	127.0002	1.524003	8.04674	196.8500	16.40417	3.10685
6 =	152.4003	1.828804	9.65608	236.2200	19.68500	3.72822
7 =	177.8003	2.133604	11.26543	275.5900	22.96583	4.34959
8 =	203.2004	2 438405	12.87478	314.9600	26.24667	4.97096
9 =	228.6004	2.743205	14.48412	354.3300	29.52750	5.59233

ITINERARY.

In compliance with the instructions of my commission, I proceeded from Washington to San Bernardino, California, reporting to Mr. T. S. Palmer, acting chief of the expedition, December 26, 1890. From that time until January 3, 1891, I was occupied in perfecting the botanical outfit of the expedition, and in becoming familiar, as far as possible, with the characteristic flora of the San Bernardino Valley. In both these matters I was greatly aided by Messrs. S. B. and W. F. Parish and Mr. W. G. Wright, well-known naturalists of San Bernardino. Mr. Frederick Funston, of Carlyle, Kansas, was commissioned as my assistant on the expedition.

On the afternoon of January 3, 1891, I left San Bernardino by the road to Cajon Pass, camping the first night at Martin's ranch, the second at Crowder's ranch, on the south slope of Cajon Pass, and on January 5 reached the railway station of Victor in the Mohave Desert. At the summit of Cajon Pass, at an altitude of about 4,000 feet, below the beginning of the evergreen forests on the mountains, the characteristic flora of the San Bernardino Valley abruptly gives way to the weird and equally characteristic flora of the Mohave Desert. The chaparral or dense shrub thicket of the south slope is replaced within a mile by the open yucca forest of the plateau. From the summit northward and eastward the surface of the desert descends with a gentle dip toward the valley of the Mohave River. At Hesperia the junipers ceased and were replaced by creosote bush (*Larrea tridentata*).

January 6 and 7 we traveled from Victor to Daggett, camping at Stoddard Wells. During these days we made our first close acquaintance with the mountains of the desert, in this region perhaps better called hills, for they were only a few hundred feet in height, rocky, treeless, with only scattered creosote bushes visible from the plain below, and even these wanting on steep slopes. The often brilliant coloration of the rocks was never obscured, for no moss nor lichens grew upon them.

January 7 to 9 we remained at Daggett, completing our supplies. My personal outfit was made up according to the needs of the expedition. I wore heavy clothing, for the weather during the winter was often cold, putting on over my coat a canvas hunting coat, and often in addition an overcoat. My shoes were of a kind in common use, but later in the season, when there was mountain-climbing to be done, it was found necessary to substitute heavy, thick-bottomed miners' shoes, their soles and heels thickly set with hobnails. A wide-brimmed felt hat, or sombrero, is very serviceable in winter, while for summer use a cork helmet or one of the manufactured equivalents, which will shade the eyes, is cooler and pleasanter. An aneroid barometer was used for measuring differences in altitude. The apparatus for collecting and pressing plants consisted of a knife, a pick, a portfolio, and two board presses. The knife was of the kind used by cotton inspectors in the Southern States to slash open the sacking that covers cotton bales. The pick was made after a pattern in common use among plant collectors in the Southwest. It was forged from steel, with a slightly curved blade about 5 inches long, 1 inch broad at the extremity, and a head about 2 inches long, narrowing to a point. The handle was slender, of strong, tough wood, and about 3 feet in length. For digging plants in hard clay soil or gravel, or among broken stones, or for uprooting cactuses and other spiny shrubs, this instrument is thoroughly satisfactory. In loam, mud, or sand, the knife is better. The portfolio was made of binders' board, covered with canvas, and was usually carried tied to the saddle. Ordinary board presses were used, the pressure applied by straps. The method of keeping field notes resolved itself, after a few weeks experimenting, into three heads—a catalogue of specimens collected, a journal, and a slip system of special notes.

January 10 to 13 we traveled from Daggett to Lone Willow Spring, camping near the first summit north of Daggett, near Copper City Spring, and at Granite Well. At Lone Willow Tanks we met another party of the expedition, which had reached that point from the north.

From January 14 to 15 we were camped at Lone Willow Tanks, excursions being made to the summit of Browns Peak and into the Slate Range.

January 19 we broke camp and set out for Death Valley by the old borax road. The excessive dryness of the region was evidenced by the fact that the pencil marks on a roadside graveboard, which had been twelve years exposed to atmospheric effects, still appeared clear and fresh, the surface of the wood retaining its natural appearance, not changing to the gray color of weathered timber. We passed the night in Long Valley, and in the morning continued down the cañon, emerging into Death Valley near the south end of its alkali-flat. On either side were high mountains and between them the narrow valley, not more than 10 miles wide. In the bottom of the valley was the snow-white stretch of salt and alkali, and to the northward, perhaps 50 miles away, mountains, valleys, and salt-flat vanished in haze. Creosote bush had been characteristic of all our route until we neared the salt-flat; but here, under the influence of clay and alkali, it gave way to greasewood,[1] that in turn to salt grass,[2] and the last to a shrub[3] related to the pickle-weed. Beyond this there was no vegetation whatever. At about the middle of the afternoon, traveling along the margin of the salt-flat, we came in sight of a large clump of mesquite[4] bushes, and a little further on we found another clump, where we made a dry camp. Near the margin of the salt-covered valley-bottom, the soil had the appearance of an area closely covered with cow-tracks, half obliterated, and with a little fine snow in the hollows. Farther out the soil was moist, smooth, and covered by a filmy, gray incrustation.

The *Allenrolfea* in this part of the valley grew in bunches, about which the soil accumulated so as to form hummocks often 3 feet in height and several feet across. In the mesquite clumps, which were in less alkaline situations, a similar banking of the soil had occurred. Dry sand blown along over the ground had drifted under the bushes, forming banks often 10 to 15 feet high, out of which the smaller branches of the mesquite projected like briars.

January 21 we reached Bennett Wells and went into camp, turning our stock out to feed on the bunch grass (*Sporobolus airoides*) that grew abundantly in the vicinity.

January 22 I made a short trip westward from camp to the gravelly mesa that slopes gently down from the foot of the Panamints, and returned to camp by a detoür northward through the mesquites.

From January 22 to 25, excursions were made from Bennett Wells to various points in the vicinity, and the three following days were occupied by a trip to Furnace Creek.

---

[1] *Atriplex polycarpa.*

[2] *Distichlis spicata.*

[3] *Allenrolfea occidentalis.*

[4] *Prosopis juliflora.*

From Bennett Wells, retracing a portion of our route, our party went (January 29 and 30) to Saratoga Springs. I remained at this camp until February 5, when I went on alone to Resting Springs, where the expedition camped until February 10. On that day a party set out for the Charleston Mountains, Nevada. We camped the first night at Twelve Mile Spring, the second night at Winter's ranch in Pahrump Valley. On the morning of February 12 we left the latter point for Clark's sawmill, situated in the yellow pine timber on the western slope of the Charleston Mountains and north of Charleston Peak. At a height of only 1,500 feet above Winter's ranch, which is about 2,800 feet above sea level, the yuccas[1] began to appear. The last that we had seen were on the Slate Range west of Lone Willow Spring. At 5,200 feet above sea level the first junipers[2] appeared, in company with a third yucca,[3] and at about 5,500 feet became abundant. At 6,100 feet the nut pine[4] began, and at 7,500 feet the yellow pine,[5] accompanied a few hundred feet higher by the white fir.[6] Owing to the depth of the snow we were unable to reach the sawmill, but camped about a mile below it at an altitude of 8,350 feet.

On the following day Mr. Palmer and I continued on foot up the slope north of the sawmill to the summit of a ridge at an altitude of 9,600 feet, and then still northward to another ridge of 10,500 feet altitude. At this point the characteristic tree is the bristle cone pine,[7] which is accompanied by the Rocky Mountain white pine.[8]

February 14 the party returned to Winter's ranch, where we remained for two days, and on the 17th we returned to Resting Springs.

The expedition having received no mail for about four weeks past, on the 19th of February a party of five crossed the valley of the Amargosa and went southward a few miles on the road toward Saratoga Springs. Then turning westward we passed up a shallow arroyo in the mesa, and soon emerging from this, traversed the sloping mesa itself until we reached the mouth of a cañon in the Funeral Mountains, west from Amargosa Borax Works. We journeyed up this cañon for several miles, nearly to the summit of the mountains, climbing around one precipice, and camped at a small but excellent spring, known as Mesquite Spring.

February 21 Mr. Funston and I set out from this point for Panamint, the nearest post-office, reaching that place February 23, after encountering a terrific snowstorm in the Panamint Mountains. From the 25th to the 28th we were returning with the mail to Ash Meadows, Nevada, by way of Johnson Cañon, Bennett Wells, and Furnace Creek.

---

[1] *Yucca macrocarpa* and *Y. arborescens.*

[2] *Juniperus californica utahensis.*

[3] *Yucca baccata.*

[4] *Pinus monophylla.*

[5] *Pinus ponderosa scopulorum.*

[6] *Abies concolor.*

[7] *Pinus aristata.*

[8] *Pinus flexilis.*

March 4 a party consisting of Mr. Bailey, Mr. Nelson, and myself, leaving the Ash Meadows camp, set out for the great bend of the Colorado River. Our route lay through Pahrump Valley, Mountain Spring Pass of the Charleston Mountains, Vegas Ranch, and the Vegas Wash. We made the return trip to Ash Meadows, from March 12 to 16, by way of Vegas Ranch, Towner's ranch, and the divide northwest of that point.

March 21 we broke camp at Ash Meadows and took the trail to Furnace Creek, reaching there on the following day. On the 24th we proceeded to Bennett Wells, and on the 25th to Johnson Cañon, in the Panamint Mountains. Here at an altitude of about 5,700 feet we located a base camp, from which excursions were made to various adjacent points, including a trip back to Furnace Creek Cañon.

April 11 we broke camp in Johnson Cañon, packed over the summit of the mountains to Panamint, and camped at Brewery Spring in Surprise Cañon, about 2 miles below the town, where we remained four days. We then moved camp to Hot Springs in Panamint Valley.

April 24 the camp at Hot Springs was broken up, one party setting out for Lone Willow Spring, en route to southern Utah, another to Shepherd Cañon, on the way to Owens Valley. I took the road to Mohave, by way of Searles's, arriving there April 26.

From this time I was absent from official duty until the evening of May 9, when I took the stage from Mohave to Keeler, in Inyo County, reaching the latter point after midnight, May 10. On the following day Sergt. H. E. Wilkinson, then United States signal officer at Keeler, now weather observer at the same place, kindly offered for the work of the survey the office facilities of the signal station. For this and much other assistance in hearty coöperation with its work, the expedition is under great obligations to Sergt. Wilkinson.

From May 11 to 17 I stayed at Keeler, making collections in that vicinity.

From April 24 to May 17 Mr. Funston, in other parties of the expedition, went from Hot Springs through Shepherd Cañon, in the Argus Mountains, to Maturango Spring, Darwin, Willow Creek Cañon, and Keeler. From May 23 to June 15 he was engaged in a trip from the point last mentioned through Cottonwood Cañon, across Mesquite Valley to Grapevine Peak, and back to Keeler by the same route.

June 18 Mr. Funston and I left Keeler for Willow Creek Cañon, following the trail over the southern end of the Inyo Range south of Cerro Gordon Mountain. The following four days were spent in making excursions down a spur of the Panamint Range into Panamint Valley and Saline Valley, and on the 23d I returned to Keeler.

From May 24 to June 10 I remained at Keeler, collecting and determining plants in that vicinity, and writing notes.

June 11 to 13 I made an excursion to Crystal Spring in the Coso Mountains, returning by way of Darwin.

June 19, having completed the packing of specimens and the preparations for the coming journey, a party composed of Dr. Merriam, Mr. Palmer, and myself, started from Lone Pine for Fort Tejon. We camped that night at Walker's ranch, near Olancha; on the 20th at a point a few miles south of Little Owens Lake; and on the 21st at Canebrake Ranch, on the western slope of Walker Pass. It is here that the desert vegetation changes to the chaparral of interior California. Several characteristic desert species were found to occur on the west slope of Walker Pass, some of them at as low an altitude as 2,800 feet. Among these plants are the following:

Aplopappus interior.
Artemisia tridentata.
Atriplex canescens.
Encelia frutescens.
Ephedra nevadensis.
Hymenoclea salsola.
Lycium andersonii.
Lycium cooperi.
Opuntia basilaris.
Opuntia echinocarpa.
Prunus andersonii.
Prunus fasciculata.
Salvia carnosa.
Tetradymia spinosa.
Yucca arborescens.

Five species of desert plants did not occur on the west side of the pass, *Larrea tridentata*, *Franseria dumosa*, *Atriplex confertifolia*, and *A. polycarpa;* but these species belong to the Lower Sonoran, a zone not represented in the valley of the South Fork of Kern River. It may be considered, therefore, that the whole desert flora, so far as the altitude of the region permits, has overrun Walker Pass and extends down as far as the junction of Canebrake Creek with the South Fork of Kern River.

Continuing on our route, we touched at Kernville and, passing through Havilah, Walker Basin, Caliente, Tehachapi Valley, and Tehachapi Cañon, reached Mohave June 26. From that point we proceeded across the desert by way of Willow Spring, Liebre Ranch, and Gorman Station, down the Cañada de las Uvas to Fort Tejon. Here we camped from June 28 to July 10. Excursions were made to various points in the adjacent mountains, including one trip to the summit of Frazier Mountain.

July 11 we broke camp at Fort Tejon and went to Tejon Ranch. From this point Mr. Palmer and I, on the following day, rode to the summit of one of the higher divides in the southern Sierra Nevada. Near the mouth of the cañon through which we passed, the common trees are oaks,[1] sycamore,[2] and poplars,[3] with a few individuals of California post cedar.[4] At about 3,000 feet the gray-leaf pine[5] begins, intermixed with a few Nevada nut pines.[6] Next above these come the yellow pine[7] and the white fir[8], while at the summit of the divide, about 3,300 feet above Tejon Ranch, the black pine[1] and the great sugar pine[2] occur. The cañon is remarkable for the unusually large number of cone-bearing trees which it contains.

---

[1] *Quercus lobata* and *Q. wislizeni.*

[2] *Plantanus racemosa.*

[3] *Populus monilifera* and *P. trichocarpa.*

[4] *Libocedrus decurrens.*

[5] *Pinus sabiniana.*

[6] *Pinus monophylla.*

[7] *Pinus ponderosa.*

[8] *Abies concolor.*

July 13 we left Tejon Ranch and followed the road directly to Bakersfield. July 15 I left Bakersfield alone for Visalia, going first into the foothills of the Sierra Nevada as far as Poso Station, on the Glenville stage line, and then following the creek down to Poso on the Southern Pacific Railroad. Thence I traveled along the railroad, arriving at Visalia July 17.

July 18 to 24 I was occupied in collecting plants and in preparing for the ascent of the Sierra Nevada.

July 25 Mr. Palmer, Mr. Bailey, Dr. Fisher, and myself went from Visalia to Three Rivers, and in the afternoon of the following day Mr. Bailey and I started for Mineral King. We camped July 26 at Kane Flat, July 27 and 28 at Big Tree Cañon, July 29 near the sawmill a few miles above the latter point, and July 30 at Mineral King.

We remained at Mineral King five days, then moved camp to a group of red firs about halfway to Farewell Gap. Many excursions into the surrounding mountains were made during our stay at these places.

August 10 we went on to Lyon Meadow, following the trail through Farewell Gap. The last few miles of this journey was outside the Government reservation, and had been pastured by sheep so closely that all the low vegetation was stripped from the ground. We found the same conditions throughout the remainder of our journey in the Sierra Nevada. Only in the moister portions of the meadows could the horses get anything to eat. We continued along the trail by way of Trout Meadows to Soda Springs, or Dicks Meadow, on the North Fork of Kern River. Here we camped several days.

On the 17th we proceeded to Whitney Meadows, camping in the edge of the forest which skirts its western margin. From this time until August 21 we were engaged in field work about Whitney and Big Cottonwood meadows,

From the 22d to the 24th of August I was occupied in a trip down the eastern slope of the Sierra Nevada to Lone Pine and Keeler.

Mr. Funston, meanwhile, had joined Mr. Nelson's party June 19. Their route lay from Lone Pine across the Inyo Mountains into Saline Valley, northward to Waucoba Peak, and across the range again to Owens Valley. They then ascended the White Mountains and traversed them as far as White Mountain Peak. Descending again on the west they crossed the head of Owens Valley by way of Benton, and went through Mammoth Pass in the Sierra Nevada to the headwaters of the San Joaquin and Merced rivers and into Yosemite Valley. Traveling southward from that place they crossed the Sierra Nevada by way of Kings River Cañon and Kearsarge Pass, and reached Lone Pine August 22.

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[1] *Pinus jeffreyi.*

[2] *Pinus lambertiana.*

On the 25th and 26th Mr. Bailey and I made an excursion about 10 miles northward from Whitney Meadows toward Mount Whitney.

August 28 I left Whitney Meadows, retracing our previous route, reaching Visalia September 1. The botanical field work of the expedition being now ended, I proceeded to San Francisco and from that point to Washington.

PRINCIPLES OF PLANT DISTRIBUTION.

DEFINITION OF TERMS.

In a discussion of the principles of plant distribution it is necessary that each term technically employed shall have a well-defined and uniform meaning. Among those words which have been used by various writers with great looseness, there are four which are of especial importance to us, range, locality, station, and habitat. One has merely to refer to our common botanical textbooks and dictionaries to find the lack of clearness in the definitions of these terms, while an attempt to use the words as defined impresses one with the necessity of reviewing their meaning.

Of these words the one which has historic precedence is *habitat*. It has been used at various times to express the different meanings which are now conveyed by all four words, and from this fact an unfortunate confusion has arisen. Another circumstance that has contributed to the cloudy understanding of these terms is that a technical meaning, not in accord with its popular use, has been ascribed to one of them. The word referred to is *station*. This term is sometimes employed to express the kind of place in which a plant occurs; but its historic use in the language is to indicate position merely.

The meanings that should logically be attached to these words are as follows:

Range—the region over which a type spontaneously grows.

Locality—the approximate geographic position of an individual specimen.

Station—the spot upon which a specimen has been collected or observed.

Habitat—the character of the place in which a type occurs.

In these definitions the word *type* is a general expression for which in particular cases variety, species, genus, or the name of any group may be substituted.

To illustrate the use of these terms, let us take as an example the species *Juncus cooperi* and the particular specimens of it collected under No. 204 of this expedition (page 237). The data may be tabulated as follows:

Range, in the Lower Sonoran zone, from Vegas Wash, Nevada, westward in California through the Amargosa Valley, Death Valley, and Panamint Valley, and again at Borrego Springs in the Colorado Desert.

Locality, Death Valley, California.

Station, edge of the salt marsh about 400 meters east of Bennett Wells, Death Valley, California.

Habitat, densely alkaline moist soil, apparently only that containing compounds of boracic acid.

It is believed that the current signification of most other terms technically used in connection with the subject of geographic distribution is sufficiently specific to make their definition unnecessary, but a few other words are explained in the text as occasion requires.

PROBLEM OF DISTRIBUTION.

In our present consideration of the distribution of plants we adopt the hypotheses—that existing species have developed from similar preexisting ones; that, in general, the successive steps in this development have originated directly from changed environment, and have become fixed by natural selection; that usually a species has held the relation to its parent of a variation connected with it by a series of intermediate forms and spreading from a single geographic center, but having a distinct range or a different habitat; and that these geographic variations have become species by the disappearance of the intermediate forms. These hypotheses have so nearly attained the rank of demonstrated propositions that it is considered unnecessary to repeat here the facts and arguments supporting them. The writer is not to be understood, however, as necessarily holding that species and even generic types have not in some cases originated from their parent species without the intervention of a complete series of connecting forms, or that the same variety or even species has never been developed from a common parent in two widely separated regions independently.

The existence of an individual plant in a particular locality rests upon two primary requirements—first, that the seed or other reproductive body be transported there; and second, that the local conditions permit its growth.

There are undoubtedly many separated regions—as, for example, the Mohave Desert and the Sahara Desert—whose environmental conditions for plants are practically identical, but whose floras consist mostly of totally distinct types, because natural transportation of seeds has been impossible. The same may be stated of certain portions of Australia as compared with the tropical and subtropical regions of America. A long list of similar cases could be made up, the two regions in each pair of names being situated in essentially different continental areas.

An excellent example of the second requirement for the growth of a plant, the proper environment, is afforded at Cajon Pass in the San Bernardino Mountains. The flora of the Mohave Desert, lying to the north and east, is here abruptly substituted, within a distance of 3 to 5 kilometers, for the flora of the San Bernardino Valley. There is abundant means for mutual transportation of seeds, by the agency both of wind and of animals; but the mingling of the two floras under the present climatic conditions is impossible, for neither can the species adapted to the moisture-laden air of the valley exist in the exceedingly arid atmosphere of the desert, nor can the desert plants compete with those of the valley under conditions favorable to the latter.

CONDITIONS THAT AFFECT DISTRIBUTION.

The continued existence of a species requires: first, that its individuals grow; and secondly, that they reproduce. That a species may spread requires, in the third place, that its reproductive bodies be disseminated. Under these three heads—growth, reproduction, dissemination—may be grouped all the causes that affect distribution; but since some of these causes would necessarily be duplicated under each head, they will not be so classified, but will be treated in one group.

Plant growth depends upon the factors of heat, light, water, food, air, and mechanique. These factors usually do not occur in nature in what may be called a pure state, but variously compounded into influencing conditions, such as climate and soil. We will attempt later to take up a few of these compound conditions one by one and reduce them to the elemental conditions enumerated above. First, a short examination of each simple condition will be made.

The effect of heat upon plants varies greatly with different species, different organs, and different stages of growth. The general important fact is, that for each function of the plant a particular temperature is most favorable, a higher or lower one less favorable, and a still higher or lower one fatal to the performance of that function. Thus each species has, during its period of growth, temperatures known in plant physiology as minimum, optimum, and maximum. Below the minimum and above the maximum, growth ceases; while from these points to the optimum, growth increases, and at the latter temperature is greatest. The principal effect of proper temperature is evaporation of moisture from the surface of the plant, which assists in the circulation of the juices and, by some method not yet understood, in the activity of the protoplasm. A minimum, or lower, temperature lessens evaporation, thereby causing stagnation of circulation and diminution of food supply, and either renders the protoplasm inactive or kills it. A temperature above the maximum is likely to so increase evaporation that the supply of moisture from the roots is not enough to meet the deficiency, and the tissues become dry and dead, while the protoplasm often is killed. Besides the period of growth, all perennial plants have a period of rest, the principal external condition of which in extratropical regions is a temperature below the minimum for the species. During this period a plant is least susceptible to bad effects from low temperatures, and indeed requires such temperatures to insure its perfect health.

Heat occurs, so far as its relation to plants is concerned, under two important phases—air heat and soil heat. The temperature of the soil, although in general conforming to that of the air above it, nevertheless always presents variations that have a marked effect in determining the habitat of plants. The effect of soil temperature is especially conspicuous in the growth of cultivated vegetation.

The influence of light upon plant growth is as fundamental as that of heat. It enables the plant to carry on certain chemical operations necessary to its life. Little attention need be paid to it, however, in considering geographic distribution, as it is a scarcely variable factor. Light is always present during the day in nearly constant amount, and even when somewhat variable is so intimately associated with coëxisting variations in heat that the exact effects of each are difficult to distinguish. The most important local variations in amount of light are those due to the shade of trees and other plants and to cloudiness.

Water might, perhaps, in a strict physiological classification, better be included under the head of food. Only a comparatively small amount, however, is utilized by the plant as food proper, the remainder being devoted to mechanical purposes. It has seemed better, therefore, to treat the subject independently. Water acts as a medium for the absorption of food materials by the roots of a plant, serves as a vehicle for the transfer of juices, and by keeping the tissues moistened and distended makes possible the performance of other vital functions. It is with soil moisture that a plant has principally to deal, but the amount of moisture in the air has an important influence upon the plant, a greater degree of humidity tending to reduce transpiration.

The food of plants needs no discussion here, except the bare statement that certain quantities and certain kinds of food are necessaries of plant existence. The word food is here used as a general term for raw food-materials ready for absorption by the roots of the plant.

Like water, air strictly should be included among the food materials of plants, for from the carbon dioxid which it carries is obtained the carbon which goes to make up the elaborated food of plants, while its oxygen is consumed in plant respiration. Yet air does not act the part of a nutritive material merely, and in general it is such an important item in plant life that it is best treated separately. One conspicuous relation which air holds to vegetable life, is that of a medium through which heat is transmitted to the plant and moisture evaporated from it. In addition, most plants demand that, to properly carry out their functions, their roots have access to a certain amount of air in the soil. So universal a substance is air, however, and so nearly constant its composition, that its variations play but little part in governing the distribution of plants.

Under the head of mechanique are included a variety of physical or mechanical necessaries of plant life. For instance, a plant might have access to the conditions of heat, light, moisture, food, and air, and yet, from lack of a place in which to stand, be unable to grow. The abstract condition that we may call position is included, therefore, under mechanique as one of the necessaries of life in the plant. Furthermore, it has been ascertained by comparatively recent experiments that the minute mechanical structure of the soil has a great effect upon the accompanying vegetation; that, for example, a sandy soil will support a plant which, in a clayey soil containing precisely the same food-materials and moisture and exposed to the same conditions of heat, light, and air, would perish. This purely mechanical influence of the soil has been found to have a marked effect in varying the vital energy of plants, and therefore in deciding which species shall fail, in certain places, to come to reproductive maturity. The fact that a wide variation exists in the mechanical structure of soils, therefore, renders the condition that is here named mechanique a very important consideration in plant distribution. Other examples of conditions that fall under this head may be cited, such as heavy winds and the eating of vegetation by animals.

Having now named what are here considered the ultimate conditions under which plants are developed and modified, it remains to enumerate and analyze some of the ordinary conditions which, as stated above, may be treated as compounds of these simple factors.

A glance at a phytogeographic map of the earth—such, for example, as that published in Berghaus's Physikalischer Atlas—indicates that differences in latitude are of primary importance in the geographic distribution of plants. The floral regions there published conform in general with latitudinal lines, and the influence of this variation in latitude is due, of course, preëminently to differences of temperature expressed in the seasons.

It should be pointed out here that the mean annual temperature of a place is not necessarily a close index of the thermal relation of that place to its flora; that is, two points having the same mean temperature may support quite different floras, from the fact that one of them has a very warm summer and a very cold winter, while the other has a much more equable temperature. Variations in the temperature of the hibernation period, especially in regions whose winter heat is rarely above 32° F., has little effect upon the vegetation. The mean temperature for the season of growth is therefore a nearer approximation than the mean annual temperature. It often happens, furthermore, that of two places showing the same mean summer temperature, the one has this season prolonged a month or two more than the other. This extra time, which is not expressed in the mean summer temperature, may permit the presence of many species of plants which in a shorter season would fail to mature and would soon become locally extinct. It has been proposed, therefore, to measure the potential growth of a season by summing up the daily temperatures. The resultant sum has been called the amount of heat, and has usually been computed by adding together the excesses of each day's mean over 32° F. for all the days of the season. There is still another element of heat which this method does not take cognizance of, namely, midsummer extremes. Two regions may have the same annual mean, summer mean, and summer amount of heat, yet the customary occasional occurrence of frosts in one of them may cause the absence of many species which occur in the other. No one of these four measures of heat—mean annual temperature, mean summer[1] temperature, amount of summer heat, and degree of summer extremes of temperature—expresses precisely the thermal sum of a region as related to its plant life; yet any one of them is a general guide to this sum, and an intelligent consideration of all four gives the nearest approximation at present attainable.

The effect of altitude is mainly reducible to that of the accompanying temperatures. It has not been demonstrated that variation in the pressure of the air has any appreciable effect upon plants. An increase in soil moisture, however, usually accompanies in arid regions any considerable increase in altitude. It results not directly from the greater altitude, but from the precipitation caused by the generally lower temperature. In a humid climate this relation does not appear to hold.

The intervention of oceanic bodies of water between continental areas is of very great importance in limiting the spread of the accompanying floras. Not merely species, but generic types, are commonly confined by this agency within a single continental area. The cause may be reduced to unfavorable conditions of mechanique—the impossibility of the transportation of seed.

Proximity to large bodies of water, such as seas, lakes, and large rivers, is often the cause of a northward extension of a more southern flora, and is explained principally by the more uniform spring and fall temperatures.

Slope exposure is a condition whose effects are felt wherever the surface of the ground has a steep slope. The south side of a mountain the inclination of which is 20° from the horizontal, receives the sun's rays much more directly than does either a level plateau or a north slope, and therefore has a higher temperature. An illustration of this effect is furnished by the desert mountains, in which the lower limit of trees on a north slope is often a thousand feet lower than on a south slope; and if a ravine with sloping sides occurs on the eastern exposure of the mountain at the altitude of about this line, its south side, sloping north, will be covered with trees, while the north side, sloping south, will be naked.

Differences in variation due to changes in soil are more conspicuous to the average observer than those due to any other cause. No item of a plant's environment combines a greater number of primary influencing conditions than this, and none within the limits of a plant zone appears to have a more direct influence upon plant life. An important part of the raw food-material of a plant must be absorbed from the soil, the amount contained therein varying with that in the rock from which the soil was formed and with that afterward infiltrated from other sources. A sufficient, yet not too great, supply of water must be furnished the plant, and in the control of this supply the soil almost solely is concerned. This phase of the influence of soil has been made the subject of a detailed study, under the auspices of the Department of Agriculture, by Mr. Milton Whitney,[1] and the results obtained by him find expression quite as fully in natural vegetation as in cultivated plants. Two secondary influences are dependent upon the amount of water in the soil, namely, the temperature of the soil and the amount of contained air. The lack of a sufficient amount of soil air prevents the proper aeration of the roots and injures or kills the plant.

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[1] The term summer is here used for the entire yearly period of growth and reproduction.

To sum up, the six ultimate factors in the distribution of vegetation are heat, light, water, food, air, and mechanique. These factors are variously combined in actual fact into such conditions, among others, as geographic isolation, latitude, altitude, rainfall, soil, fires, proximity to large bodies of water; slope exposure, and presence of forests.

The external conditions of plant life, which have been briefly discussed above, constitute one of the two groups of forces which have combined to bring about the present distribution of plants. This first group of forces is the environment, the second is the plants themselves with all their vital energies. The different species possess certain structural and physiological characteristics, such as mechanisms for the transportation of seeds and ability to withstand freezing, all of which occur in endless variety. The consideration of this second set of forces makes up a large part of textbooks on physiological and structural botany, and no analysis of them need be given here.

COMPARATIVE VALUES OF PLANTS IN DETERMINING FLORAL ZONES.

The term *zonal plant* as used in this report, designates a species or variety which is of value in determining floral zones. Not all plants are serviceable for this purpose, as a considerable amount of field work has clearly demonstrated. Upon the Death Valley Expedition it was found impracticable, after a short experience, to record each day in the field a series of observations including all the altitudes of all the species seen, and at the same time to collect specimens of each new or doubtful plant. It was found to be the best method of procedure in a new area to establish the zones by means of a comparatively small number of the best zonal plants, and afterwards to arrange the other less important ones in their proper places in the schedule.

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[1] Some Physical Properties of Soils in their Relation to Moisture and Crop Distribution. By Milton Whitney. U. S. Department of Agriculture, Weather Bureau, Bulletin No. 4. 1892.

The first of the two characteristics of a good zonal plant is that it shall have a definite termination at the borders of a zone, or at lines substantially parallel thereto but closer together. For example, *Larrea tridentata* occurs throughout all except the highest altitudes of the Lower Sonoran zone, while *Grayia spinosa* occupies only a comparatively narrow but well-defined strip, or *belt*, in the upper portion of this zone. The latter species, although confined within closer limits, is nevertheless an important zonal plant, for it indicates, if not the limits of the zone, certain definite points within them. The area actually occupied by this plant may be called the *Grayia* belt.

Secondly, the belt of a zonal plant should be continuous. It frequently happens that an area may be perfectly adapted to the support of a certain species but that other plants of more robust growth have crowded it out. When such a condition of affairs exists over large areas, the zonal relations of the species may be obscured and the plant be of little value in this respect. Furthermore, a zonal plant should be able to grow on as great a variety of soils as possible, for one portion of a zone is likely to differ in this respect from another. It is a matter of common experience that the vegetation of a sandy soil is strikingly different from that of an adjacent clayey soil.

If the plants of any region be tested by these two principles, most of the nonvaluable species may be eliminated.

Aquatic plants in most cases possess neither of the characteristics described above. Their place of growth, in streams or other bodies of water, necessarily confines them to small portions of a region's surface; while a far more important fact—that the controling element in their distribution is the temperature of water, not the temperature of air—renders possible their growth at almost any altitude or any latitude. It is worthy of remark that the distribution of aquatic plants may be expected to accord approximately with that of fishes, in a manner analogous to the known general accordance of the distribution of terrestrial plants with that of terrestrial animals; for one factor of the highest importance, temperature of air, is common to the two groups of terrestrial organisms, while the temperature of water is the main controlling influence with the two aquatic groups. It was found to be true that not only the aquatic species but also the marsh plants of the desert are almost without exception those of similar habitat in other less arid regions. In vertical distribution, too, a similar lack of confinement within floral boundaries is constantly observed. On the banks of mountain streams occur many species not confined to one zone, but extending over two or three.

The group of plants shown by experience to be most reliable as zonal guides is composed of the trees and shrubs. A little thought directed to the conditions which contribute to the growth of such plants explains

this fact. Shrubs and trees, being commonly larger than herbaceous plants, reach higher into the air and penetrate more deeply into the soil, thereby subjecting themselves to a wider range of conditions than do these smaller plants. They also, by continuing throughout the year exposed to successive, varying seasonal conditions, complete the full round of their possibilities in environment. They therefore stand as the most complete summation that can be attained of the natural light, heat, moisture, food, air, and mechanique of any area; in other words, a sure index of the natural agricultural capacity of the soil upon which they grow. From a utilitarian point of view, too much stress can scarcely be laid upon this fact. It has been the practice of agriculturists to gauge the capacity of soils, in regions new to the plow, by observations on rainfall, temperature, cloudiness, chemical composition of the soil, drainage, and many other phenomena, or by the even more laborious process of experimenting on every farm with each kind of cultivated product; ignoring the fact that this determination can be greatly hastened, cheapened, and authenticated by correlating the natural vegetation, especially that made up of the trees and shrubs, with that of other regions whose agricultural capacities are known.

Perennials stand next in value to woody plants and are constantly used in zonal classification. They differ from the last group in their usually smaller size, and especially in the death, each autumn, of that portion of the plant above ground. This fact removes from the experiences of perennial plants the aerial conditions of the winter months, and to this extent they fail to represent the total of their possible environment. The effect of winter climatic conditions upon the life of a plant is really of slight importance in comparison with that of the conditions active during the period of growth and reproduction, yet the effect of the former is often clearly apparent.

Least reliable of the three vegetative groups of plants are annuals, for they represent the conditions of but a single season of growth. The importance of this fact is clear when the wide variation in conditions from year to year is considered. A season of unusual cold, or great drought, or extraordinary rainfall may completely change the aspect of the annual vegetation of any district, and those plants which one year indicate its character may entirely fail to do so in the year following. It is found furthermore that the vertical range of these plants is very uncertain. If, for example, a small annual, the length of whose life is but two months, is accustomed to grow upon hot sandy soil, it is very likely to find during an unusually warm summer congenial spots at altitudes far above its ordinary range, in which it can grow and bear seed abundantly. This could not happen to a perennial or a shrub, for before such a plant reached the maturity necessary for reproduction, adverse conditions would destroy its life.

For the reasons given above, therefore, trees and shrubs must form the basis of zonal work. That they are of such importance is the more

fortunate because they form the most conspicuous vegetative features of the landscape. Over certain large areas of the United States, on the other hand, such as prairies and certain sorts of arid lands, none but herbaceous vegetation exists, and in such cases we must have recourse to perennials. It is not to be inferred, however, that annuals are entirely erratic in their distribution. On the contrary, most of the species are found to fall conformably into some one of the primary floras, though often overstepping the true zonal limits.

DISTRIBUTION OF PLANTS IN SOUTHEASTERN CALIFORNIA.

CLASSIFICATION OF FLORAS.

A full discussion of the characteristics and limits of the life zones in the region examined by the expedition is given by Dr. C. Hart Merriam in the general report. The object of the present outline is to present a few of the more strictly botanical aspects of distribution in this region, in order to render intelligible the zonal references employed in other parts of the report.

So far as plant life is concerned, the most important topographic feature of California, and in fact of the whole region of North America west of the Rocky Mountains, is the great Cordilleran system of mountains. This, composed of the Cascade Mountains, Sierra Nevada, San Bernardino Mountains, and San Jacinto Mountains, with their connecting ridges, extends as the backbone of the western country from British Columbia to Lower California. From the Pacific Ocean, blowing eastward, come winds which, under the proper conditions, would bring rain and fertility to all the region west of the Rocky Mountains; but the cold summits of the Cordilleras precipitate all the water that is brought to them by the west winds, so that none is left for the ultramontane basin. The interior of the State of California is occupied by an immense valley, made up of the valleys of the Sacramento and San Joaquin rivers, and bounded on the west, except at the bay of San Francisco, by a smaller mountain system, the Coast Range, separating the valley from the true coastal lowlands. At the southern end of this great interior valley the Coast Range sweeps eastward to meet the Sierra Nevada.

We have, therefore, as the most important physical characteristic of our region, a series of parallel lowlands separated by intervening highlands. The essential climatic feature of these lowlands is their successive increase in aridity from west to east.

To the effect of various degrees of aridity upon the flora of California must be added another set of influences dependent, not primarily upon any striking topographic feature of the State, but upon variations in latitude. The cold of northern California is in marked contrast with the mild climate of the southern part of the State. On the basis of

this fact. Shrubs and trees, being commonly larger than herbaceous plants, reach higher into the air and penetrate more deeply into the soil, thereby subjecting themselves to a wider range of conditions than do these smaller plants. They also, by continuing throughout the year exposed to successive, varying seasonal conditions, complete the full round of their possibilities in environment. They therefore stand as the most complete summation that can be attained of the natural light, heat, moisture, food, air, and mechanique of any area; in other words, a sure index of the natural agricultural capacity of the soil upon which they grow. From a utilitarian point of view, too much stress can scarcely be laid upon this fact. It has been the practice of agriculturists to gauge the capacity of soils, in regions new to the plow, by observations on rainfall, temperature, cloudiness, chemical composition of the soil, drainage, and many other phenomena, or by the even more laborious process of experimenting on every farm with each kind of cultivated product; ignoring the fact that this determination can be greatly hastened, cheapened, and authenticated by correlating the natural vegetation, especially that made up of the trees and shrubs, with that of other regions whose agricultural capacities are known.

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We have [illegible] sical characteristic of our r [illegible] high [illegible] su [illegible] temperature California is divided into belts extending theoretically east and west, but in reality bent northward or southward in deep folds by variations in the altitude of different sections of the State.

The flora of California may be likened to a checker-board, the lines between the squares representing isohygrometric and isothermal lines, the former running north and south, the latter following the course of the mountain ranges. The separate blocks, as they actually exist in nature, do not present the form of squares, but are quite misshapen and distorted. The chaparral belt, for example, which represents one of these blocks, lies along the western slope of the Sierra Nevada in a narrow strip extending from north to south quite throughout the region examined by the expedition. It is not the object of this part of the report to give the exact geographic and topographic limits of these blocks, but to state their relative position and to name their principal characteristic plants.

We shall consider first the region east of the Cordilleran system commonly known as the desert. In every portion of it containing mountains of high altitude, there is a prominent feature of the vegetation which marks a well-defined and almost complete change in the flora. This feature is the lower limit of timber. On all the higher ranges there exists a covering of coniferous forest extending down to the altitude of about 1,800 meters. Between the Sierra Nevada and the great bend of the Colorado the timber-crested mountains that came under my personal observation were the Inyo, Coso, Argus, Panamint, Grapevine, Charleston, and Desert ranges. The timbered area of these mountains, compared with the total area of the region in which they lie, or even with the whole surface of the mountains themselves, is very small. To this great treeless area we shall now turn our attention.

This part of the whole region is not separated by geographic lines into smaller divisions, characterized by different degrees of moisture or heat; but the temperature of its various portions, and therefore the humidity as well, changes with the altitude. Of two points with different altitudes, the higher has a lower temperature and greater humidity than the other. It is in conformity with these relations that the vegetation of the treeless desert area varies. A particular species usually grows between two rather evenly defined limits of altitude. If these limits fall upon the same mountain side, the area there covered by the species is narrow; if a broad plain stretches out at an altitude intermediate between the same limits, the plant grows over the whole area. The customary belt of any species, therefore, can be obtained by passing two imaginary parallel planes across the face of the country, cutting its surface at the limiting altitudes of the species. All that portion of the surface lying between the cutting lines constitutes the *customary belt* of the species in question; that is, the area over which the plant may be expected to grow.

The most widely and generally diffused shrub of the desert is the creosote bush, *Larrea tridentata.* It occurs from the bottom of Death Valley, at an altitude below sea-level, to about 1,500 meters on the mountains, at most points falling short of the lower limit of timber. A shrub almost as widely distributed, and with practically the same altitudinal limits, is *Franseria dumosa.* The upper limit of the belt of these two shrubs is only a little below the lower limit of timber, and has therefore been adopted as a convenient unit in the geographic botany of the region. The area outlined by these species has been correlated by Dr. Merriam with similar areas in adjacent regions, and the name Lower Sonoran applied to the zone thus constituted. In other words, the Lower Sonoran zone, which is a broad transcontinental belt, coincides in the desert region of southern California approximately with the distribution of *Larrea tridentata* and *Franseria dumosa.*

In the remarks that follow concerning this zone, reference is made solely to that section of it which lies in ultramontane California and in adjacent Nevada, Utah, and Arizona; that is, within the limits of the desert.

The varying physical features of the region make it necessary to note the different plant habitats which the Lower Sonoran zone affords. The wide mesas, which constitute the gentler valley slopes and the greater portion of the broad desert basins, make up the principal area of the region. The soil of the mesas is composed of gravel, or even bowlders in the more inclined parts, while in portions more nearly horizontal and more remote from the mountains it is of a fine and even quality. In various sections it is prevailingly calcareous, argillaceous, or siliceous, according to the nature of the rocks from which it was derived. The vegetation of the mesas is affected neither by the sheltering influence of rocks nor by springs or other immediate sources of water, but is exposed to characteristic desert conditions. Constituting, therefore, the greater part of the whole flora geographically, and being fairly typical of the region, it requires the first consideration.

Among the shrubs of the mesa, *Larrea tridentata* and *Franseria dumosa* are, as already stated, the commonest; but at various points some one or more of several other species named in the following list are often abundant:

Acamptopappus sphærocephalus.
Amphiachyris fremontii.
Aster mohavensis.
Atriplex confertifolia.
Atriplex hymenelytra.
Bebbia juncea aspera.
Cassia armata.
Cereus engelmanni.
Echinocactus polycephalus.
Ephedra californica.
Hymenoclea salsola.
Krameria parvifolia.
Lycium andersonii.
Opuntia basilaris.
Opuntia echinocarpa
Salazaria mexicana.
Tetradymia comosa.
Yucca arborescens.
Yucca macrocarpa.

Some of these species, as *Acamptopappus sphærocephalus*, *Aster mohavensis*, and *Yucca arborescens*, are confined to the upper altitudes of the zone; while others such as *Franseria dumosa*, *Hymenoclea salsola*, *Larrea tridentata*, and *Lycium andersonii* are common nearly throughout it. *Atriplex hymenelytra* grows only on gravelly mesas in conspicuously alkaline soil. *Cassia armata* grows preferably in sandy, dry washes.

The common perennials of the mesas are *Cladothrix oblongifolia*, *Euphorbia polycarpa*, *Lepidium fremontii*, and *Mirabilis lævis*, while the most abundant of the large number of annuals are *Atrichoseris platyphylla*, *Chorizanthe rigida*, *Cleomella obtusifolia*, *Encelia eriocephala*, *Eschscholtzia minutiflora*, *Gilia floccosa*, *Leptosyne bigelovii*, *Plantago patagonica gnaphaloides*, and *Sisymbrium canescens*.

Ascending from the mesa into the cañons and up broken rocky slopes of the mountain ranges, one encounters certain plants that are confined to these habitats. Among shrubs of this character may be designated *Aplopappus cuneatus*, *Bigelovia teretifolia*, *Coleosanthus atractyloides*, and *Hofmeisteria pluriseta;* among perennials, *Arenaria macradenia*, *Eucnide urens*, and *Nicotiana trigonophylla;* and among annuals, *Macrocalyx micranthus*, *Parietaria debilis*, and *Pterostegia drymarioides*. The plants that occupy the bottoms of cañons, growing upon the gravelly or sandy washes which they contain, are, in the absence of running streams, the species of similar situations in the open desert; but the plants enumerated above are those which grow in the shade of rocks or in their crevices. Such plants are called *rupestrine*. Their habitat furnishes them peculiar advantageous conditions, consisting of increased moisture, more uniform soil temperature, and apparently certain qualities of soil mechanique not yet explainable. Rupestine plants present in their environment and characteristics some of the phenomena of moist-soil vegetation and constitute in a measure a group intermediate in these respects between xerophilous and paludose plants.

In the bottoms of many closed valleys there exist areas over which, after a heavy rainfall, standing water accumulates. In the smaller valleys, from which the water is soon evaporated, the resultant soil formation is a level expanse of very hard clay, which in most cases does not crack when dry and which is often strongly alkaline, not sufficiently so, however, to present an efflorescence. Such an area is commonly known as a dry lake. If the valley is large and adjacent to high mountains, the water which collects in it may be sufficient to keep the valley-bottom moist throughout the year. In these instances the surface of the soil, when not covered with water, is incrusted with salt or some alkaline deposit. Such an area is commonly called a marsh or flat, with some word like salt, soda, or alkali prefixed to indicate the popular notion of the nature of the deposit.

A dry lake contains no vegetation except at its margin. Here is found a growth of shrubs consisting commonly of *Atriplex polycarpa*, and often of *A. confertifolia* and *Suæda suffrutescens* in addition.

The surface of an alkaline marsh is likewise devoid of vegetation, but its margin supports in many cases a luxuriant growth. A section at Bennett Wells, Death Valley, from the salt-marsh to the mesa illustrates the flora of such an area.

First there occurs a strip, a few meters broad, of *Allenrolfea occidentalis;* next, a similar strip of *Juncus cooperi;* and third, a belt of *Sporobolus airoides* and *Pluchea sericea* about 300 meters broad. Across the second and third belts *Distichlis spicata* occurs sparingly, mixed with the other plants. Over all three areas the thin alkaline crust on the soil is continuous or nearly so, and there is no loose sand. The fourth belt consists of *Prosopis juliflora* and *Atriplex canescens*, intermixed in some cases with *Suæda suffrutescens.* Sand has drifted into clumps of these plants, so that the ground consists of a succession of dry hummocks, the hollows between them showing either a slight alkaline efflorescence or in some cases an incrustation. At one point this belt is about 750 meters broad. The next belt is made up principally of *Atriplex polycarpa*, with a few scattered specimens of *Larrea tridentata.* The soil is a mixture of gravel and clay, with some visible trace of alkali. The sixth belt is that of *Larrea tridentata.* The soil is composed of sand and gravel, seldom showing a trace of alkaline deposit on its surface. Along the margin nearest the preceding belt *Atriplex hymenelytra* is abundant, while in the other direction *Franseria dumosa*, *Eriogonum inflatum*, *Cladothrix oblongifolia*, and *Hymenoclea salsola* appear, followed by the other vegetation of the mesa.

The living springs and streams of the desert are characterized by a still different group of plants. The shrubs and trees common in the vicinity of such places are *Populus fremontii*, *Prosopis pubescens*, *Salix longifolia* and *Salix nigra venulosa.* Several perennials, such as *Apocynum cannabinum*, *Berula erecta*, *Eleocharis rostellata*, *Juncus balticus*, *Nitrophila occidentalis*, *Scirpus lacustris occidentalis*, *S. olneyi*, *S. americanus*, and *Typha angustifolia*, are abundant, while *Polypogon monspeliensis* is a frequent annual.

Between a gravelly mesa, a dry lake, an alkaline marsh, and a spring all geological gradations occur, with corresponding combinations in the accompanying plants.

As stated in an earlier paragraph, certain of the desert mountain ranges between the Sierra Nevada and the Colorado River rise to a sufficient altitude to be crowned with coniferous timber. The flora of these areas differs from that of the desert proper in the possession not only of arboreal vegetation, but also of a different group of shrubs and herbaceous plants. A belt of *Pinus monophylla*, about 600 meters in thickness, constitutes the lower part of this timbered area and, together with *Juniperus californica utahensis*, which mingles with the piñon and often extends 50 meters below it, marks a zone that has been denominated the Upper Sonoran.

The following shrubs are abundant in this zone:

Artemisia tridentata.
Ceanothus greggii.
Garrya veatchii flavescens.
Kunzia glandulosa.
Ribes leptanthum brachyanthum.
Salvia carnosa.

In most cases each piñon or juniper tree stands distinct from its neighbor, and, being well supplied with light on all sides, develops a short trunk and a rounded form, the branches commonly spreading nearly to the ground.

Between the lower limit of the juniper and the upper limit of *Larrea* is an interval of transition ground characterized by the growth of the following shrubs:

Coleogyne ramosissima.
Dalea polyadenia (in the northern part of the region).
Prunus fasciculata (in the ravines).
Ephedra viridis.
Eurotia lanata.
Grayia spinosa.
Tetradymia glabrata.
Tetradymia spinosa.

It is on this transition ground that *Yucca arborescens* attains, in the southern portion of the region, its fullest development both in size and numbers.

Above the piñons and junipers of the Upper Sonoran zone lies a belt, about 800 meters in thickness, to which the name Transition zone has been applied.[1] In the Charleston Mountains it is covered by a forest of *Pinus ponderosa scopulorum*, and on the eastern slope of the Sierra Nevada by *Pinus jeffreyi*. This zone lies at a sufficiently great elevation not to be severely affected by the aridity or humidity of the subjacent valleys. It therefore crosses the Sierra Nevada, and is represented on their western slope by a belt of *Pinus ponderosa*, in its lower part, and another of *P. jeffreyi* in its upper part.

Between timber-line and the upper limit of the Transition zone is another zone characterized in the desert by forests of *Pinus flexilis* and *P. aristata* and known as the Boreal zone. In none of the mountains between the southern Sierra Nevada and the Colorado River does a true timber-line appear, but northward the White Mountains of Nevada, and southward the San Bernardino Mountains, extend above this limit. An abnormal condition of affairs exists on the Panamint Mountains, in the absence of any tree taking the place of *Pinus ponderosa scopulorum*, which finds its western limit in the Charleston Mountains. The nut pines, not having any forests above them with which to compete, grow to an unusually high altitude, and *Pinus flexilis* and *P. aristata* unusually low; so that the Transition zone appears, from the absence of its most conspicuous characteristic tree, to be squeezed out entirely, although it is still marked by the presence of *Juniperus occidentalis* and *Cercocarpus ledifolius*.

At the time of examination of the desert mountains, the Transition and Boreal zones, and a portion of the Upper Sonoran also, were covered with snow, so that only their arboreal vegetation could be seen.

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[1] Merriam, North American Fauna, No. 5, p. 24 (1891).

On the western slope of the Sierra Nevada the Transition zone is marked by the presence, as already stated, of a belt of *Pinus jeffreyi* and another of *Pinus ponderosa.* The Boreal zone is represented by *Abies magnifica*, *Pinus monticola*, *P. murrayana*, and *P. balfouriana.*

The most conspicuous differences between the floras of ultramontane and intramontane California[1] are to be found at low altitudes, the Upper and Lower Sonoran zones on the one side being correlated respectively with the chaparral and foothill belts on the other.

The chaparral belt of the western slope of the Sierra Nevada lies next below the belt of *Pinus ponderosa*, or farther south, where this tree is wanting, below the belt of *Pinus jeffreyi.* It is a dense growth of shrubs or small trees often so closely set as to be almost impenetrable. In the upper portion of the belt the plants are of smaller stature and more intricate growth, while toward its lower limit some of the species, like *Quercus chrysolepis*, become trees of large dimensions. The principal woody species characteristic of the chaparral belt are as follows:

Adenostoma fasciculatum.
Arctostaphylos ———.
Ceanothus vestitus.
Cercocarpus parvifolius.
Fremontodendron californicum.
Garrya veatchii.
Pinus sabiniana.
Quercus breweri.
Quercus chrysolepis.

The foothill belt lies between the chaparral on the one hand, and the valley-bottoms of the intramontane region on the other. Its woody vegetation is much more open than that of the chaparral belt, but of different species, as follows:

Æsculus californica.
Ceanothus cuneatus.
Ceanothus divaricatus.
Lonicera interrupta.
Lonicera subspicata.
Prunus ilicifolia.
Quercus douglasii.
Quercus lobata.
Ramona polystachya.
Rhus diversiloba.
Salvia mellifera.

The surface of the Tulare Plains, except the alkaline bottoms, contains no shrubs, but a scant growth of herbaceous vegetation made up principally of annuals, with a few perennial species, such as *Croton californicus*, *Croton setigerus*, and *Asclepias erosa.*

The differences in vegetation between the foothill belt and the plains appear to be caused, however, largely by habitat and not to be the signs of a true zonal demarkation.

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[1] "The word 'intramontane' is applied to that portion of California west of a line of mountains made up of the Sierra Nevada, San Bernardino, and San Jacinto ranges, together with their connecting ridges. That area is thus distinguished from the ultramontane or desert and Great Basin portions of the State. The two regions are marked by distinct characteristic floras. North of the Sierra Nevada and south of the San Jacinto Mountains the precise location of the dividing line has not been clearly determined." Coville, Proceedings of the Biological Society of Washington, Vol. VII, p. 80 (1892).

of a plant's environment combines a greater number of primary influencing conditions than this, and none within the limits of a plant zone appears to have a more direct influence upon plant life. An important part of the raw food-material of a plant must be absorbed from the soil, the amount contained therein varying with that in the rock from which the soil was formed and with that afterward infiltrated from other sources. A sufficient, yet not too great, supply of water must be furnished the plant, and in the control of this supply the soil almost solely is concerned. This phase of the influence of soil has been made the subject of a detailed study, under the auspices of the Department of Agriculture, by Mr. Milton Whitney,[1] and the results obtained by him find expression quite as fully in natural vegetation as in cultivated plants. Two secondary influences are dependent upon the amount of water in the soil, namely, the temperature of the soil and the amount of contained air. The lack of a sufficient amount of soil air prevents the proper aeration of the roots and injures or kills the plant.

To sum up, the six ultimate factors in the distribution of vegetation are heat, light, water, food, air, and mechanique. These factors are variously combined in actual fact into such conditions, among others, as geographic isolation, latitude, altitude, rainfall, soil, fires, proximity to large bodies of water; slope exposure, and presence of forests.

The external conditions of plant life, which have been briefly discussed above, constitute one of the two groups of forces which have combined to bring about the present distribution of plants. This first group of forces is the environment, the second is the plants themselves with all their vital energies. The different species possess certain structural and physiological characteristics, such as mechanisms for the transportation of seeds and ability to withstand freezing, all of which occur in endless variety. The consideration of this second set of forces makes up a large part of textbooks on physiological and structural botany, and no analysis of them need be given here.

COMPARATIVE VALUES OF PLANTS IN DETERMINING FLORAL ZONES.

The term *zonal plant* as used in this report, designates a species or variety which is of value in determining floral zones. Not all plants are serviceable for this purpose, as a considerable amount of field work has clearly demonstrated. Upon the Death Valley Expedition it was found impracticable, after a short experience, to record each day in the field a series of observations including all the altitudes of all the species seen, and at the same time to collect specimens of each new or doubtful plant. It was found to be the best method of procedure in a new area to establish the zones by means of a comparatively small number of the best zonal plants, and afterwards to arrange the other less important ones in their proper places in the schedule.

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[1] Some Physical Properties of Soils in their Relation to Moisture and Crop Distribution. By Milton Whitney. U. S. Department of Agriculture, Weather Bureau, Bulletin No. 4. 1892.

The first of the two characteristics of a good zonal plant is that it shall have a definite termination at the borders of a zone, or at lines substantially parallel thereto but closer together. For example, *Larrea tridentata* occurs throughout all except the highest altitudes of the Lower Sonoran zone, while *Grayia spinosa* occupies only a comparatively narrow but well-defined strip, or *belt*, in the upper portion of this zone. The latter species, although confined within closer limits, is nevertheless an important zonal plant, for it indicates, if not the limits of the zone, certain definite points within them. The area actually occupied by this plant may be called the *Grayia* belt.

Secondly, the belt of a zonal plant should be continuous. It frequently happens that an area may be perfectly adapted to the support of a certain species but that other plants of more robust growth have crowded it out. When such a condition of affairs exists over large areas, the zonal relations of the species may be obscured and the plant be of little value in this respect. Furthermore, a zonal plant should be able to grow on as great a variety of soils as possible, for one portion of a zone is likely to differ in this respect from another. It is a matter of common experience that the vegetation of a sandy soil is strikingly different from that of an adjacent clayey soil.

If the plants of any region be tested by these two principles, most of the nonvaluable species may be eliminated.

Aquatic plants in most cases possess neither of the characteristics described above. Their place of growth, in streams or other bodies of water, necessarily confines them to small portions of a region's surface; while a far more important fact—that the controling element in their distribution is the temperature of water, not the temperature of air—renders possible their growth at almost any altitude or any latitude. It is worthy of remark that the distribution of aquatic plants may be expected to accord approximately with that of fishes, in a manner analogous to the known general accordance of the distribution of terrestrial plants with that of terrestrial animals; for one factor of the highest importance, temperature of air, is common to the two groups of terrestrial organisms, while the temperature of water is the main controlling influence with the two aquatic groups. It was found to be true that not only the aquatic species but also the marsh plants of the desert are almost without exception those of similar habitat in other less arid regions. In vertical distribution, too, a similar lack of confinement within floral boundaries is constantly observed. On the banks of mountain streams occur many species not confined to one zone, but extending over two or three.

The group of plants shown by experience to be most reliable as zonal guides is composed of the trees and shrubs. A little thought directed to the conditions which contribute to the growth of such plants explains

this fact. Shrubs and trees, being commonly larger than herbaceous plants, reach higher into the air and penetrate more deeply into the soil, thereby subjecting themselves to a wider range of conditions than do these smaller plants. They also, by continuing throughout the year exposed to successive, varying seasonal conditions, complete the full round of their possibilities in environment. They therefore stand as the most complete summation that can be attained of the natural light, heat, moisture, food, air, and mechanique of any area; in other words, a sure index of the natural agricultural capacity of the soil upon which they grow. From a utilitarian point of view, too much stress can scarcely be laid upon this fact. It has been the practice of agriculturists to gauge the capacity of soils, in regions new to the plow, by observations on rainfall, temperature, cloudiness, chemical composition of the soil, drainage, and many other phenomena, or by the even more laborious process of experimenting on every farm with each kind of cultivated product; ignoring the fact that this determination can be greatly hastened, cheapened, and authenticated by correlating the natural vegetation, especially that made up of the trees and shrubs, with that of other regions whose agricultural capacities are known.

Perennials stand next in value to woody plants and are constantly used in zonal classification. They differ from the last group in their usually smaller size, and especially in the death, each autumn, of that portion of the plant above ground. This fact removes from the experiences of perennial plants the aerial conditions of the winter months, and to this extent they fail to represent the total of their possible environment. The effect of winter climatic conditions upon the life of a plant is really of slight importance in comparison with that of the conditions active during the period of growth and reproduction, yet the effect of the former is often clearly apparent.

Least reliable of the three vegetative groups of plants are annuals, for they represent the conditions of but a single season of growth. The importance of this fact is clear when the wide variation in conditions from year to year is considered. A season of unusual cold, or great drought, or extraordinary rainfall may completely change the aspect of the annual vegetation of any district, and those plants which one year indicate its character may entirely fail to do so in the year following. It is found furthermore that the vertical range of these plants is very uncertain. If, for example, a small annual, the length of whose life is but two months, is accustomed to grow upon hot sandy soil, it is very likely to find during an unusually warm summer congenial spots at altitudes far above its ordinary range, in which it can grow and bear seed abundantly. This could not happen to a perennial or a shrub, for before such a plant reached the maturity necessary for reproduction, adverse conditions would destroy its life.

For the reasons given above, therefore, trees and shrubs must form the basis of zonal work. That they are of such importance is the more

fortunate because they form the most conspicuous vegetative features of the landscape. Over certain large areas of the United States, on the other hand, such as prairies and certain sorts of arid lands, none but herbaceous vegetation exists, and in such cases we must have recourse to perennials. It is not to be inferred, however, that annuals are entirely erratic in their distribution. On the contrary, most of the species are found to fall conformably into some one of the primary floras, though often overstepping the true zonal limits.

DISTRIBUTION OF PLANTS IN SOUTHEASTERN CALIFORNIA.

CLASSIFICATION OF FLORAS.

A full discussion of the characteristics and limits of the life zones in the region examined by the expedition is given by Dr. C. Hart Merriam in the general report. The object of the present outline is to present a few of the more strictly botanical aspects of distribution in this region, in order to render intelligible the zonal references employed in other parts of the report.

So far as plant life is concerned, the most important topographic feature of California, and in fact of the whole region of North America west of the Rocky Mountains, is the great Cordilleran system of mountains. This, composed of the Cascade Mountains, Sierra Nevada, San Bernardino Mountains, and San Jacinto Mountains, with their connecting ridges, extends as the backbone of the western country from British Columbia to Lower California. From the Pacific Ocean, blowing eastward, come winds which, under the proper conditions, would bring rain and fertility to all the region west of the Rocky Mountains; but the cold summits of the Cordilleras precipitate all the water that is brought to them by the west winds, so that none is left for the ultramontane basin. The interior of the State of California is occupied by an immense valley, made up of the valleys of the Sacramento and San Joaquin rivers, and bounded on the west, except at the bay of San Francisco, by a smaller mountain system, the Coast Range, separating the valley from the true coastal lowlands. At the southern end of this great interior valley the Coast Range sweeps eastward to meet the Sierra Nevada.

We have, therefore, as the most important physical characteristic of our region, a series of parallel lowlands separated by intervening highlands. The essential climatic feature of these lowlands is their successive increase in aridity from west to east.

To the effect of various degrees of aridity upon the flora of California must be added another set of influences dependent, not primarily upon any striking topographic feature of the State, but upon variations in latitude. The cold of northern California is in marked contrast with the mild climate of the southern part of the State. On the basis of temperature California is divided into belts extending theoretically east and west, but in reality bent northward or southward in deep folds by variations in the altitude of different sections of the State.

The flora of California may be likened to a checker-board, the lines between the squares representing isohygrometric and isothermal lines, the former running north and south, the latter following the course of the mountain ranges. The separate blocks, as they actually exist in nature, do not present the form of squares, but are quite misshapen and distorted. The chaparral belt, for example, which represents one of these blocks, lies along the western slope of the Sierra Nevada in a narrow strip extending from north to south quite throughout the region examined by the expedition. It is not the object of this part of the report to give the exact geographic and topographic limits of these blocks, but to state their relative position and to name their principal characteristic plants.

We shall consider first the region east of the Cordilleran system commonly known as the desert. In every portion of it containing mountains of high altitude, there is a prominent feature of the vegetation which marks a well-defined and almost complete change in the flora. This feature is the lower limit of timber. On all the higher ranges there exists a covering of coniferous forest extending down to the altitude of about 1,800 meters. Between the Sierra Nevada and the great bend of the Colorado the timber-crested mountains that came under my personal observation were the Inyo, Coso, Argus, Panamint, Grapevine, Charleston, and Desert ranges. The timbered area of these mountains, compared with the total area of the region in which they lie, or even with the whole surface of the mountains themselves, is very small. To this great treeless area we shall now turn our attention.

This part of the whole region is not separated by geographic lines into smaller divisions, characterized by different degrees of moisture or heat; but the temperature of its various portions, and therefore the humidity as well, changes with the altitude. Of two points with different altitudes, the higher has a lower temperature and greater humidity than the other. It is in conformity with these relations that the vegetation of the treeless desert area varies. A particular species usually grows between two rather evenly defined limits of altitude. If these limits fall upon the same mountain side, the area there covered by the species is narrow; if a broad plain stretches out at an altitude intermediate between the same limits, the plant grows over the whole area. The customary belt of any species, therefore, can be obtained by passing two imaginary parallel planes across the face of the country, cutting its surface at the limiting altitudes of the species. All that portion of the surface lying between the cutting lines constitutes the *customary belt* of the species in question; that is, the area over which the plant may be expected to grow.

The most widely and generally diffused shrub of the desert is the creosote bush, *Larrea tridentata.* It occurs from the bottom of Death Valley, at an altitude below sea-level, to about 1,500 meters on the mountains, at most points falling short of the lower limit of timber. A shrub almost as widely distributed, and with practically the same altitudinal limits, is *Franseria dumosa.* The upper limit of the belt of these two shrubs is only a little below the lower limit of timber, and has therefore been adopted as a convenient unit in the geographic botany of the region. The area outlined by these species has been correlated by Dr. Merriam with similar areas in adjacent regions, and the name Lower Sonoran applied to the zone thus constituted. In other words, the Lower Sonoran zone, which is a broad transcontinental belt, coincides in the desert region of southern California approximately with the distribution of *Larrea tridentata* and *Franseria dumosa.*

In the remarks that follow concerning this zone, reference is made solely to that section of it which lies in ultramontane California and in adjacent Nevada, Utah, and Arizona; that is, within the limits of the desert.

The varying physical features of the region make it necessary to note the different plant habitats which the Lower Sonoran zone affords. The wide mesas, which constitute the gentler valley slopes and the greater portion of the broad desert basins, make up the principal area of the region. The soil of the mesas is composed of gravel, or even bowlders in the more inclined parts, while in portions more nearly horizontal and more remote from the mountains it is of a fine and even quality. In various sections it is prevailingly calcareous, argillaceous, or siliceous, according to the nature of the rocks from which it was derived. The vegetation of the mesas is affected neither by the sheltering influence of rocks nor by springs or other immediate sources of water, but is exposed to characteristic desert conditions. Constituting, therefore, the greater part of the whole flora geographically, and being fairly typical of the region, it requires the first consideration.

Among the shrubs of the mesa, *Larrea tridentata* and *Franseria dumosa* are, as already stated, the commonest; but at various points some one or more of several other species named in the following list are often abundant:

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Cereus engelmanni.
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Hymenoclea salsola.
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Salazaria mexicana.
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Yucca macrocarpa.

Some of these species, as *Acamptopappus sphærocephalus*, *Aster mohavensis*, and *Yucca arborescens*, are confined to the upper altitudes of the zone; while others such as *Franseria dumosa*, *Hymenoclea salsola*, *Larrea tridentata*, and *Lycium andersonii* are common nearly throughout it. *Atriplex hymenelytra* grows only on gravelly mesas in conspicuously alkaline soil. *Cassia armata* grows preferably in sandy, dry washes.

The common perennials of the mesas are *Cladothrix oblongifolia*, *Euphorbia polycarpa*, *Lepidium fremontii*, and *Mirabilis lævis*, while the most abundant of the large number of annuals are *Atrichoseris platyphylla*, *Chorizanthe rigida*, *Oleomella obtusifolia*, *Encelia eriocephala*, *Eschscholtzia minutiflora*, *Gilia floccosa*, *Leptosyne bigelovii*, *Plantago patagonica gnaphaloides*, and *Sisymbrium canescens*.

Ascending from the mesa into the cañons and up broken rocky slopes of the mountain ranges, one encounters certain plants that are confined to these habitats. Among shrubs of this character may be designated *Aplopappus cuneatus*, *Bigelovia teretifolia*, *Coleosanthus atractyloides*, and *Hofmeisteria pluriseta;* among perennials, *Arenaria macradenia*, *Eucnide urens*, and *Nicotiana trigonophylla;* and among annuals, *Macrocalyx micranthus*, *Parietaria debilis*, and *Pterostegia drymarioides*. The plants that occupy the bottoms of cañons, growing upon the gravelly or sandy washes which they contain, are, in the absence of running streams, the species of similar situations in the open desert; but the plants enumerated above are those which grow in the shade of rocks or in their crevices. Such plants are called *rupestrine*. Their habitat furnishes them peculiar advantageous conditions, consisting of increased moisture, more uniform soil temperature, and apparently certain qualities of soil mechanique not yet explainable. Rupestine plants present in their environment and characteristics some of the phenomena of moist-soil vegetation and constitute in a measure a group intermediate in these respects between xerophilous and paludose plants.

In the bottoms of many closed valleys there exist areas over which, after a heavy rainfall, standing water accumulates. In the smaller valleys, from which the water is soon evaporated, the resultant soil formation is a level expanse of very hard clay, which in most cases does not crack when dry and which is often strongly alkaline, not sufficiently so, however, to present an efflorescence. Such an area is commonly known as a dry lake. If the valley is large and adjacent to high mountains, the water which collects in it may be sufficient to keep the valley-bottom moist throughout the year. In these instances the surface of the soil, when not covered with water, is incrusted with salt or some alkaline deposit. Such an area is commonly called a marsh or flat, with some word like salt, soda, or alkali prefixed to indicate the popular notion of the nature of the deposit.

A dry lake contains no vegetation except at its margin. Here is found a growth of shrubs consisting commonly of *Atriplex polycarpa*, and often of *A. confertifolia* and *Suæda suffrutescens* in addition.

The surface of an alkaline marsh is likewise devoid of vegetation, but its margin supports in many cases a luxuriant growth. A section at Bennett Wells, Death Valley, from the salt-marsh to the mesa illustrates the flora of such an area.

First there occurs a strip, a few meters broad, of *Allenrolfea occidentalis;* next, a similar strip of *Juncus cooperi;* and third, a belt of *Sporobolus airoides* and *Pluchea sericea* about 300 meters broad. Across the second and third belts *Distichlis spicata* occurs sparingly, mixed with the other plants. Over all three areas the thin alkaline crust on the soil is continuous or nearly so, and there is no loose sand. The fourth belt consists of *Prosopis juliflora* and *Atriplex canescens*, intermixed in some cases with *Suæda suffrutescens.* Sand has drifted into clumps of these plants, so that the ground consists of a succession of dry hummocks, the hollows between them showing either a slight alkaline efflorescence or in some cases an incrustation. At one point this belt is about 750 meters broad. The next belt is made up principally of *Atriplex polycarpa*, with a few scattered specimens of *Larrea tridentata.* The soil is a mixture of gravel and clay, with some visible trace of alkali. The sixth belt is that of *Larrea tridentata.* The soil is composed of sand and gravel, seldom showing a trace of alkaline deposit on its surface. Along the margin nearest the preceding belt *Atriplex hymenelytra* is abundant, while in the other direction *Franseria dumosa*, *Eriogonum inflatum*, *Cladothrix oblongifolia*, and *Hymenoclea salsola* appear, followed by the other vegetation of the mesa.

The living springs and streams of the desert are characterized by a still different group of plants. The shrubs and trees common in the vicinity of such places are *Populus fremontii*, *Prosopis pubescens*, *Salix longifolia* and *Salix nigra venulosa.* Several perennials, such as *Apocynum cannabinum*, *Berula erecta*, *Eleocharis rostellata*, *Juncus balticus*, *Nitrophila occidentalis*, *Scirpus lacustris occidentalis*, *S. olneyi*, *S. americanus*, and *Typha angustifolia*, are abundant, while *Polypogon monspeliensis* is a frequent annual.

Between a gravelly mesa, a dry lake, an alkaline marsh, and a spring all geological gradations occur, with corresponding combinations in the accompanying plants.

As stated in an earlier paragraph, certain of the desert mountain ranges between the Sierra Nevada and the Colorado River rise to a sufficient altitude to be crowned with coniferous timber. The flora of these areas differs from that of the desert proper in the possession not only of arboreal vegetation, but also of a different group of shrubs and herbaceous plants. A belt of *Pinus monophylla*, about 600 meters in thickness, constitutes the lower part of this timbered area and, together with *Juniperus californica utahensis*, which mingles with the piñon and often extends 50 meters below it, marks a zone that has been denominated the Upper Sonoran.

The following shrubs are abundant in this zone:

Artemisia tridentata.
Ceanothus greggii.
Garrya veatchii flavescens.
Kunzia glandulosa.
Ribes leptanthum brachyanthum.
Salvia carnosa.

In most cases each piñon or juniper tree stands distinct from its neighbor, and, being well supplied with light on all sides, develops a short trunk and a rounded form, the branches commonly spreading nearly to the ground.

Between the lower limit of the juniper and the upper limit of *Larrea* is an interval of transition ground characterized by the growth of the following shrubs:

Coleogyne ramosissima.
Dalea polyadenia (in the northern part of the region).
Prunus fasciculata (in the ravines).
Ephedra viridis.
Eurotia lanata.
Grayia spinosa.
Tetradymia glabrata.
Tetradymia spinosa.

It is on this transition ground that *Yucca arborescens* attains, in the southern portion of the region, its fullest development both in size and numbers.

Above the piñons and junipers of the Upper Sonoran zone lies a belt, about 800 meters in thickness, to which the name Transition zone has been applied.[1] In the Charleston Mountains it is covered by a forest of *Pinus ponderosa scopulorum*, and on the eastern slope of the Sierra Nevada by *Pinus jeffreyi*. This zone lies at a sufficiently great elevation not to be severely affected by the aridity or humidity of the subjacent valleys. It therefore crosses the Sierra Nevada, and is represented on their western slope by a belt of *Pinus ponderosa*, in its lower part, and another of *P. jeffreyi* in its upper part.

Between timber-line and the upper limit of the Transition zone is another zone characterized in the desert by forests of *Pinus flexilis* and *P. aristata* and known as the Boreal zone. In none of the mountains between the southern Sierra Nevada and the Colorado River does a true timber-line appear, but northward the White Mountains of Nevada, and southward the San Bernardino Mountains, extend above this limit. An abnormal condition of affairs exists on the Panamint Mountains, in the absence of any tree taking the place of *Pinus ponderosa scopulorum*, which finds its western limit in the Charleston Mountains. The nut pines, not having any forests above them with which to compete, grow to an unusually high altitude, and *Pinus flexilis* and *P. aristata* unusually low; so that the Transition zone appears, from the absence of its most conspicuous characteristic tree, to be squeezed out entirely, although it is still marked by the presence of *Juniperus occidentalis* and *Cercocarpus ledifolius*.

At the time of examination of the desert mountains, the Transition and Boreal zones, and a portion of the Upper Sonoran also, were covered with snow, so that only their arboreal vegetation could be seen.

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[1] Merriam, North American Fauna, No. 5, p. 24 (1891).

On the western slope of the Sierra Nevada the Transition zone is marked by the presence, as already stated, of a belt of *Pinus jeffreyi* and another of *Pinus ponderosa.* The Boreal zone is represented by *Abies magnifica, Pinus monticola, P. murrayana,* and *P. balfouriana.*

The most conspicuous differences between the floras of ultramontane and intramontane California[1] are to be found at low altitudes, the Upper and Lower Sonoran zones on the one side being correlated respectively with the chaparral and foothill belts on the other.

The chaparral belt of the western slope of the Sierra Nevada lies next below the belt of *Pinus ponderosa,* or farther south, where this tree is wanting, below the belt of *Pinus jeffreyi.* It is a dense growth of shrubs or small trees often so closely set as to be almost impenetrable. In the upper portion of the belt the plants are of smaller stature and more intricate growth, while toward its lower limit some of the species, like *Quercus chrysolepis,* become trees of large dimensions. The principal woody species characteristic of the chaparral belt are as follows:

Adenostoma fasciculatum.
Arctostaphylos ———.
Ceanothus vestitus.
Cercocarpus parvifolius.
Fremontodendron californicum.
Garrya veatchii.
Pinus sabiniana.
Quercus breweri.
Quercus chrysolepis.

The foothill belt lies between the chaparral on the one hand, and the valley-bottoms of the intramontane region on the other. Its woody vegetation is much more open than that of the chaparral belt, but of different species, as follows:

Æsculus californica.
Ceanothus cuneatus.
Ceanothus divaricatus.
Lonicera interrupta.
Lonicera subspicata.
Prunus ilicifolia.
Quercus douglasii.
Quercus lobata.
Ramona polystachya.
Rhus diversiloba.
Salvia mellifera.

The surface of the Tulare Plains, except the alkaline bottoms, contains no shrubs, but a scant growth of herbaceous vegetation made up principally of annuals, with a few perennial species, such as *Croton californicus, Croton setigerus,* and *Asclepias erosa.*

The differences in vegetation between the foothill belt and the plains appear to be caused, however, largely by habitat and not to be the signs of a true zonal demarkation.

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[1] "The word 'intramontane' is applied to that portion of California west of a line of mountains made up of the Sierra Nevada, San Bernardino, and San Jacinto ranges, together with their connecting ridges. That area is thus distinguished from the ultramontane or desert and Great Basin portions of the State. The two regions are marked by distinct characteristic floras. North of the Sierra Nevada and south of the San Jacinto Mountains the precise location of the dividing line has not been clearly determined." Coville, Proceedings of the Biological Society of Washington, Vol. VII, p. 80 (1892).

To sum up, we find on the eastern side of the Sierra Nevada a desert region whose lower altitudes lie in a zone called the Lower Sonoran, marked below by the presence of *Larrea tridentata*, and above by a narrow treeless belt characterized by several shrubs and in many parts by an abundant growth of *Yucca arborescens*; and next, a zone known as the Upper Sonoran, covered by a scant forest of *Pinus monophylla* and *Juniperus californica utahensis*. On the western slope of the Sierra Nevada there occurs first, at its base, a foothill belt characterized most prominently by the presence of *Quercus douglasii*, and above this a chaparral belt to be identified by a dense growth of many shrubs and small trees, notably *Quercus chrysolepis* and *Cercocarpus parvifolius*. These two belts are correlated respectively with the Lower and Upper Sonoran zones of the desert. Above all these belts, and extending from the western slope of the Sierra Nevada in California to the Charleston Moüntains of Nevada, but at an altitude so great as to cut only a few of the higher mountains, lies the Transition zone, marked in the Sierra Nevada by the presence of *Pinus ponderosa* and *P. jeffreyi*, in the desert mountains by *Pinus ponderosa scopulorum* or, in the absence of that tree, by *Juniperus occidentalis monosperma* and *Cercocarpus ledifolius*. Above the Transition comes the Boreal zone, represented only in the highest of the desert peaks, and occupying all the space between the Transition zone and timber-line. Its principal characteristic trees in the Sierra Nevada are *Pinus monticola*, *P. balfouriana*, and *P. murrayana*, and in the desert mountains *Pinus flexilis* and *Pinus aristata*.

GEOGRAPHIC RELATIONSHIP OF THE FLORA OF THE HIGH SIERRA NEVADA, CALIFORNIA.

The two great mountain systems of the western United States are, first the Rocky Mountains, and second the Sierra Nevada and Cascade Mountains. The former stretches from New Mexico northward, through Colorado, Wyoming, Idaho, and Montana, into British America; the latter, from southern California, at about 35° N. lat., through that State, Oregon, and Washington, likewise into British America. Between these two barriers lies the Great Basin, merging at the south into the desert. At their southern ends the ranges are widely separated and the broad desert intervenes; but in British Columbia the two systems draw closer together, the depressed plains between them become studded with other mountains, and the cold of the northern latitude allows the boreal flora of the mountain crests to descend more nearly to the base level of the country. Under these conditions we should expect the boreal flora of any portion of one system to be most nearly similar to that of other portions of the same system; and, indeed, that each system would constitute a distinct line of southward boreal migration. To test the validity of this surmise, a comparative examination of the flora of the high Sierra Nevada has been made. The list of plants collected in the Boreal zone by the expedition has been reduced by removing all species which are not clearly distinguished from their relatives, or which are not distinctly boreal plants, or which from their inconspicuous appearance may not have been collected widely enough to establish their range. The remaining species, which are believed to constitute a fair representation of the boreal Sierran flora, have been separated into four groups: (*a*) those confined to the Sierra Nevada; (*b*) those common to the Sierra Nevada and the Cascade Mountains only; (*c*) those common to the Sierra Nevada and Rocky Mountains only; and (*d*) those common to the Sierra Nevada, Cascade Mountains, and Rocky Mountains. The list is given herewith:

List of representative boreal plants collected in the Sierra Nevada.[1]

(*a*) CONFINED TO THE SIERRA NEVADA.

Arabis platysperma	Also in Nevada.
Arctostaphylos nevadensis.	
Arenaria compacta.	
Artemisia rothrockii.	
Aster andersonii	Also in Nevada.
Bigelovia bolanderi	Genus confined to North America.
Bryanthus breweri.	
Chrysopsis breweri	Genus confined to North America
Crepis intermedia pleurocarpa.	
Draba lemmoni	Also in the Blue Mountains of Oregon.
Epilobium obcordatum	Also in Nevada.
Erysimum asperum perenne.	
Eulophus parishii	Also in the San Bernardino and San Jacinto mountains of southern California. Genus confined to America.
Gentiana serrata holopetala	Possibly in Oregon.
Hemizonia wheeleri	Genus confined to western North America.
Hulsea algida	Genus confined to western North America.
Lupinus breweri.	
Lupinus covillei.	
Orochænactis thysanocarpha.	
Pedicularis attollens.	
Pinus balfouriana.	
Potentilla santolinoides.	
Potentilla wheeleri.	
Primula suffrutescens.	
Raillardella argentea	Genus confined to western North America.
Ranunculus oxynotus.	
Salix macrocarpa argentea.	
Saxifraga bryophora.	
Streptanthus tortuosus	Genus confined to western North America.
Tanacetum canum	Also in Nevada.
Velæa vestita	Also in the San Bernardino Mountains.

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[1] Further collecting, especially in the Cascade Mountains, may alter the position of some of the plants in this list.

(*b*) COMMON TO THE SIERRA NEVADA AND CASCADE MOUNTAINS ONLY.

Allotropa virgata.
Carex breweri.
Claytonia triphylla.
Gentiana newberryi.
Juncus orthophyllus.
Lonicera conjugialis................Also in Nevada.
Potentilla glandulosa nevadensis.
Salix barclayi ....Also northward to Alaska.

(*c*) COMMON TO THE SIERRA NEVADA AND ROCKY MOUNTAINS ONLY.

Alsine baicalensis ....Also in Asia.
Aster trifidus.
Carex incurva.
Cercocarpus ledifolius...............Also in the Blue Mountains.
Gilia nuttallii.
Helenium hoopesii..................Genus confined to North America.
Holodiscus discolor.
Jamesia americana.
Juncoides spicatum.
Navarretia breweri.
Polemonium confertum.
Potentilla procumbens ....Also in Alaska and circumpolar.
Sambucus melanocarpa ....Also in eastern Oregon.
Swertia perennis ....Also in Alaska and circumpolar.
Pinus flexilis.
Ribes leptanthum.
Salix glauca villosa.
Scirpus pauciflorus.................Also in Alaska and circumpolar.

(*d*) COMMON TO THE SIERRA NEVADA, CASCADE MOUNTAINS, AND ROCKY MOUNTAINS.

Alsine longipes.
Antennaria dioica..................Also in Alaska and circumpolar.
Arabis hirsuta ....Also circumpolar.
Arnica chamissonis.................Also in Alaska.
Carex aurea ....Also circumpolar.
Carex festiva........................Also circumpolar.
Carex filifolia.
Carex tenella.......................Also circumpolar.
Claytonia chamissoi.
Crepis nana.........................Also in Asia.
Deschampsia cæspitosa ....Also circumpolar.
Draba stenoloba....................Also in Alaska.
Epilobium anagallidifolium.........Also circumpolar.
Erigeron compositus................Also circumpolar.
Erigeron salsuginosus ....Also in Alaska.
Erigeron uniflorus..................Also circumpolar.
Festuca ovina brevifolia.
Glyceria pauciflora.
Heuchera rubescens.................Only south of Colorado in the Rocky Mountains.
Juncus parryi.
Juncus subtriflorus ....Also in Alaska.
Kalmia glauca microphylla.
Lonicera involucrata.
Mitella pentandra.

Phleum alpinum	Also circumpolar.
Phlox douglasii.	
Pinus albicaulis	Not south of Montana in the Rocky Mountains.
Pinus monticola	Not south of Montana in the Rocky Mountains.
Pinus murrayana.	
Polygonum bistortoides	Also circumpolar.
Pulsatilla occidentalis	In the Rocky Mountains north of the United States boundary only.
Ribes cereum.	
Ribes oxyacanthoides saxosum.	
Ribes viscosissimum	Also in Utah, but not in Colorado nor southward.
Rumex geyeri.	
Saxifraga nivalis	Also circumpolar.
Saxifraga punctata	Also in Alaska.
Sedum roseum	Also circumpolar.
Spraguea umbellata	Only north of Colorado in the Rocky Mountains. Genus confined to western North America.
Tellima tenella	Genus confined to western North America.
Trifolium longipes.	
Trisetum spicatum	Also circumpolar.
Valeriana sylvatica.	

From this list it appears that nearly one-half of these plants are common to the three regions, a fact which emphasizes the community of origin of all our boreal vegetation. About one-third of the whole number are confined to the Sierra Nevada. This is a large percentage for the endemic constituent of any region which climatically so closely resembles other portions of the same continental area. In this instance the broad geographical isolation of the Sierra Nevada, and the great antiquity of this isolation, may explain the phenomenon.

The unexpected results of the tabulation are exhibited in the comparative numerical size of groups (*b*) and (*c*). These lists indicate that the flora of the high Sierra Nevada of California has an affinity quite as close with that of the Rocky Mountains of Colorado as with that of the Cascade Mountains of Oregon and Washington. In suggesting a reason for this remarkable and, at first thought, puzzling fact, we shall first group the species of the whole list according to the theoretical course of their original migration.

In group (*d*) there are several plants (*Pulsatilla occidentalis*, *Pinus albicaulis*, etc.) which, while found in all three regions, are confined in the Rocky Mountains to the district north of Wyoming and Colorado. The floral intercommunication of the northern Cascades with the northern Rockies must have been very free in later glacial times, and the plants in group (*b*), together with the few last indicated in group (*d*), form a group of which the original center of migration, it is very probable, was in the more western of the two great mountain systems. The plants of group (*d*), except those just expunged, constitute a group which was in process of diffusion from the beginning to the end of the last glacial recession, and whose distribution therefore became very general in both meridional and transcontinental directions. The plants mentioned in group (*c*) appear to have developed during the period of recession, and must have originated in places so situated that they could migrate equally well to the southern portion of both mountain systems. The time of such origin must have been before these mountains had attained their present wide floral separation, for otherwise the same species would not be found in both; and it must have been later than the first part of the last glacial recession, for these species have not migrated to the northern limits of the two mountain systems. And finally, the species in group (*a*) presumably have originated since the floral isolation of the Sierra Nevada.

To explain the present distribution of our third group, we must assume a means of communication between the floras of the Sierra Nevada and those of the southern Rocky Mountains shortly before their final separation. It is believed that this communication may easily have taken place across Nevada and Utah by way of the numerous mountain ranges which traverse those regions. Under their present conditions of isolation, the migration of these species would be impossible; but when the present boreal flora was depressed nearly or quite to the base level of the mountains, an excellent route for migration was presented. This explanation is rendered still more probable by the occurrence of nearly all the species of group (*c*) upon one or more of the higher desert ranges, such as the White, East Humboldt, and Trinity mountains of Nevada, and the Uinta and Wahsatch mountains of Utah. Besides these ranges there are many others which rise to the height of 2,000 meters or more, while the base level of the intervening plains is above 1,500 meters.

The tabulation of species here presented may serve as an illustration of two other principles concerning the boreal vegetation of the United States:

First, a circumpolar plant of the Boreal zone, if it occurs in the United States at all, is usually found over broad areas or at widely separated points. This principle is supported by the fact that the group of species common to all three mountain ranges contains twelve that are circumpolar, while none of the other columns contain a single circumpolar species. Several of these twelve species are found also in the high mountains of the Apalachian system in the eastern United States. This indicates that the present boreal flora was at one time diffused over the base level of a large transverse zone south of the Canadian line; in other words, that the flora of the United States in glacial times was far more homogeneous in an east and west direction than our present flora, and conversely that if the flora of our present austral region should be driven northward and to higher altitudes—that is, to the position of our present boreal flora—by a general continental increase of temperature, the resulting high mountain floras of the Sierra Nevada and of the Apalachian system would be totally different.

Secondly, our two western great mountain systems do not show marked isolation as a group, but each has a well-defined individual isolation.

Of the species common to the Sierra Nevada, Cascade Mountains, and Rocky Mountains, nearly one-half are also either Alaskan or circumpolar; while the number of those common to the three ranges and confined within them is less than the number confined to the Sierra Nevada alone.

GEOGRAPHIC RELATIONSHIP OF THE FLORA OF DEATH VALLEY.

The flora of Death Valley itself is wholly different from that of the high Sierra Nevada, in both its systematic and its geographic relationship. A list of the species actually collected there is given below. Little comment in addition to that given in other parts of the report is necessary. The explanation of the relative abundance of the various groups of plants into which the list is divided, and of the adaptations of these various types to their environment, is the same as that of the desert vegetation in general, and may be consulted on pages 42 to 55.

The geographic relationship of the Death Valley flora is clear, without a tabulation of the distribution of its various species. The arid plants of the valley, almost without exception, are species which extend far southward into Mexico through the States of Sonora and Chihuahua, and which are there confined to the arid interior plateau of that country.

LIST OF PLANTS FOUND IN DEATH VALLEY.

I. PLANTS GROWING IN MOIST SOIL.

(*a*) Trees.

Prosopis juliflora.
Prosopis pubescens.

(*b*) Shrubs.

Allenrolfea occidentalis.
Atriplex lentiformis.
Atriplex parryi.
Baccharis sergilioides.
Pluchea sericea.
Salix longifolia.

(*c*) Perennials.

Agrostis verticillata.
Andropogon macrourus.
Anemopsis californica.
Apocynum cannabinum.
Chara fœtida.
Cladium mariscus.
Distichlis spicata.
Eleocharis rostellata.
Elymus triticoides.
Epipactis gigantea.
Fimbristylis thermalis.
Imperata hookeri.
Juncus balticus.
Juncus cooperi.
Lythrum album.
Nitrophila occidentalis.
Panicum crusgalli.
Phragmites vulgaris.
Ruppia maritima.
Schœnus nigricans.
Scirpus americanus.
Scirpus lacustris occidentalis.
Scirpus maritimus.
Scirpus olneyi.
Sisyrinchium bellum.
Solidago spectabilis.
Sorghum halepense.
Sporobolus airoides.
Sporobolus asperifolius.
Sporobolus depauperatus.
Suæda suffrutescens.
Typha angustifolia.

(*d*) Annuals.

Chenopodium murale.
Chloris elegans.
Heliotropium curassavicum.
Malva parviflora.
Melilotus indica.
Polypogon monspeliensis.
Sonchus asper.
Trisetum barbatum.

II. PLANTS GROWING IN DRY SOIL.

(*a*) Trees.

(None.)

(*b*) Shrubs.

Amphiachyris fremontii.
Aster mohavensis.
Atriplex canescens.
Atriplex hymenelytra.
Atriplex polycarpa.
Bigelovia teretifolia.
Dalea fremontii.
Echinocactus polycephalus.
Encelia farinosa.
Ephedra nevadensis.
Eucnide urens.
Franseria dumosa.
Hymenoclea salsola.
Larrea tridentata.
Mamillaria tetrancistra.
Opuntia basilaris.
Opuntia echinocarpa.
Peucephyllum schottii.
Salvia mohavensis.
Sphæralcea munroana.

(*c*) Perennials.

Bœrhavia annulata.
Cladothrix oblongifolia.
Cryptanthe racemosa.
Cucurbita palmata.
Eragrostis purshii.
Eriogonum inflatum.
Euphorbia polycarpa.
Hofmeisteria pluriseta.
Lupinus ornatus.
Nicotiana trigonophylla.
Œnothera cardiophylla.
Petalonyx thurberi.
Physalis crassifolia.
Psathyrotes ramosissima.
Ptiloria exigua.
Sieglingia pulchella.
Stipa viridula.
Viguiera reticulata.

(*d*) Annuals.

Abronia villosa.
Achyronychia cooperi.
Amsinckia tessellata.
Antirrhinum filipes.
Atrichoseris platyphylla.
Chænactis attenuata.
Chorizanthe brevicornu.
Chorizanthe rigida.
Cryptanthe angustifolia.
Cryptanthe cycloptera.
Cryptanthe intermedia.
Cryptanthe ramosissima.
Dalea mollis.
Dicoria canescens.
Dipetalia subulata.
Draba sonoræ.
Encelia eriocephala.
Eremiastrum bellioides.
Emmenanthe penduliflora.
Erodium cicutarium.
Eschscholtzia minutiflora.
Filago californica.
Gilia latifolia.
Lepidium lasiocarpum.
Leptosyne bigelovii.
Linanthus filiformis.
Linanthus jonesii.
Macrocalyx micranthus.
Malacothrix glabrata.
Malveopsis rotundifolia.
Mentzelia albicaulis.
Mentzelia reflexa.
Mohavea breviflora.
Nemacladus ramosissimus.
Œnothera brevipes.
Œnothera refracta.
Œnothera scapoidea purpurascens.

(*d*) Annuals—Continued.

Oxystylis lutea.
Pectocarya linearis.
Perityle emoryi nuda.
Phacelia crenulata.
Phacelia fremontii.
Phacelia pachyphylla.
Piptocalyx circumscissus.
Plantago patagonica gnaphaloides.
Pterostegia drymarioides.
Salvia columbariæ.
Stylocline micropoides.
Sisymbrium canescens.

CHARACTERISTICS AND ADAPTATIONS OF THE DESERT FLORA.

SOURCE AND DISTRIBUTION OF MOISTURE.

The amount of rainfall in Death Valley has never been recorded for the entire year. The observations of the Weather Bureau for the five months, May to September, 1891, show a total amount during that time of 1.4 inches,[1] but since the rainfall for the whole desert region is known to be distributed nonuniformly through the year, this record undoubtedly does not represent five-twelfths of the total amount. An average of ten Weather Bureau stations[2] in the adjacent desert region probably represents more nearly the actual yearly rainfall in Death Valley. This average is 5.155 inches—in round numbers, 5 inches. The utter inadequacy of this amount to support any ordinary vegetation may be comprehended by comparing it with the average yearly rainfall at Dodge City, Kansas. For the years 1874 to 1883 the mean annual rainfall at this point was 20.09 inches.[3] In the vicinity of this place wheat, sorghum, and alfalfa cannot be grown without irrigation, under the old methods of cultivation, save in an exceptionally favorable season. The mean annual rainfall at Washington, D. C., for the years 1872 to 1883 was 43.27 inches.[4]

The distribution of rainfall through the year is especially important. The average of the mean monthly rainfall at the ten stations noted above is as follows :

	Inches.		Inches.
January	.638	July	.218
February	.609	August	.300
March	.642	September	.141
April	.165	October	.184
May	.318	November	.278
June	.035	December	1.627

A glance at this record shows that the rainy months are December, January, February, and March. The first two of these months are the coldest of the year, so that the rain which falls during that time seldom shows any immediate marked effect on the vegetation; but the increasing temperature of February and March, accompanied by a good rainfall, soon shows its effect in the springing up of the annual vegetation. Little rain falls in April, and during that month the annuals mature their fruit and die, while the shrubs prepare themselves for the coming drought of the hot months.

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[1] Bulletin No. 1, Weather Bureau, p. 25 (1892).

[2] Barstow, Bishop Creek, Camp Cady, Camp Independence, Daggett, Fenner, Keeler, and Needles, in California; El Dorado Cañon, in Nevada; and Yuma, in Arizona.

[3] Ann. Rep. Chief Signal Officer of the Army for 1884, p. 301.

[4] Ibid., p. 303.

The source of the moisture which gives rise to the rainfall of the desert region, has been made the subject of an interesting contribution to meterological knowledge by Lieut. J. P. Finley. The scantiness of its rain supply is due to its form and situation—a broad, depressed basin far removed from oceanic waters and nearly surrounded by high mountains. Whatever moisture is carried toward this basin by the east winds from the Gulf of Mexico, is precipitated upon the high plateaus and mountains of Texas and New Mexico; while the west winds from the Pacific deposit their surplus moisture largely upon the coast ranges of California and more completely in the cold, high altitudes of the Sierra Nevada, the San Bernardino, and the San Jacinto mountains. The only channel, therefore, through which the wind can bring oceanic moisture into the desert, is the broad valley of the lower Colorado River, connecting with the Gulf of California; and this is the source of the winter rain storms, characterized by their slow formation, wide extent, and duration usually of two to four days.

The summer rains are quite different in character and origin. They are showers or thunderstorms varying in length from a few minutes to several hours, and confined within very narrow limits. Occasionally they are intensified into furious cloud-bursts. In Death Valley these rains are of comparatively frequent occurrence, twenty-two being recorded during the five months' stay of the weather observer. In several cases only a trace of rain fell, and the greatest fall in any single instance amounted to only .54 inch, the total for the five months being, as already stated, only 1.4 inches.

The moisture that forms these rains is believed by Lieut. Finley to be derived immediately from the snow upon the higher peaks of the desert, deposited there during the long winter storms. The amount of each fall of rain in summer is so slight that the dry, hot air quickly reabsorbs it. Its effect upon the growth of vegetation is therefore in almost all cases inappreciable.

Perhaps the most significant of the meteorological observations taken in Death Valley, so far as they relate to the growth of vegetation, were those on the humidity of the air. The amount of moisture in any atmosphere is usually expressed in terms of relative humidity, or the proportion of the actual amount of moisture present to the amount which would render the air, at the same temperature, saturated. The average relative humidity, at 5 o'clock in the afternoon, for the five months covered by the observations, was 15.6 per cent; for July, 12.6 per cent; and for August, 13 per cent; while on the 4th and 5th of August a minimum of only 5 per cent was reached. These records of the relative humidity in Death Valley are decidedly lower than those of any other meteorological station in the United States, and the significance of this low degree of humidity lies in the enormous capability for evaporation possessed by air in such a condition. There are few plants which, in a soil practically air-dried, have developed a sufficient amount of absorptive root surface and a sufficiently small and slowly evaporative leaf and stem surface to keep from drying up.

CONSERVATION OF MOISTURE.

In the examination of the characteristics of desert vegetation, one ot the causative conditions most important to be kept in mind is the immediate source of water supply for the plant. The winter and spring rainfall, which is the primary source of moisture, has already been discussed, but the method of its conservation is of almost equal importance.

The moisture contained in soils is commonly classified, according to the mechanical method of its retention, as hydrostatic, capillary, and hygroscopic. Hydrostatic moisture exists in the form of free water—such, for example, as that which rises in a well, or that which stands beneath the surface of a swamp. Capillary moisture is that which the soil has absorbed from any source by capillary attraction. The maximum of capillary moisture for any soil is the amount that a suspended body of that soil will retain without dripping, while a zero amount is contained in soil dried in atmospheric air. Hygroscopic moisture is that which remains attached to the particles of air-dried soil. It is not visible, but its presence may be demonstrated by heating the soil in a kiln, when the moisture is given off as vapor. Conversely, hygroscopic moisture is that absorbed by kiln-dried soil upon exposure to atmospheric air.

In the deserts of the Death Valley region permanent hydrostatic moisture is rare. It exists about springs and the streams which flow from them, and in the bottoms of some of the larger valleys. Where such water is not intensely alkaline, or is situated only a few yards beneath the surface, its presence is indicated by a growth of mesquite, and if its depth is only a few feet other indicative plants occur. One of them, *Sporobolus airoides*, locally known as bunch grass (a name applied unfortunately to many other plants as well), has come to be of special importance to the desert traveler, for it indicates the presence, within a few feet of the surface, of water sufficiently fresh to drink. Such sources of water are, however, not to be considered in a discussion of the desert proper.

Capillary moisture also exists in the vicinity of springs and permanent underground water supplies; but in such cases, like the hydrostatic moisture from which it arises, it has no connection with the true desert vegetation.

Local rainfall alone, then, remains to be considered. As the rain is precipitated it is taken up eagerly by the parched soil as capillary moisture. In a long-continued storm or a series of storms, the process may go on almost indefinitely, so that the effect perhaps reaches to the depth of several feet. But as soon as the period of rain ceases, the hot desert air dries the surface of the ground, and the capillary currents are reversed. At the same time the seeds of annual plants germinate, and absorption begins in the roots of all the vegetation. Nearly all the moisture thus absorbed is evaporated from the surface of the leaves and stems, a small proportion only, together with the nutritive material in solution, being retained for use in the construction of the new tissues of the plant. This double process of reëvaporation goes on for days or even weeks, until the capillary moisture of the soil is exhausted, or in other words until the soil has become air-dried. This period coincides in time with the active annual growth in the vegetation, and is the direct cause of it; and on the other hand the cessation of growth is an accurate index of the exhaustion of capillary moisture.

Why the spring or the summer, or whatever seasonal name is applied to the period of growth, is so variable both in the time of its beginning and in its duration, may now be easily understood. The fall rains explain the frequent phenomenon of a well-defined autumn blooming of desert plants, and the varying amount of the early rains decides the varying luxuriance of the spring growth in different years. A few weeks after the great February storm of 1891, Mr. C. R. Orcutt found in the Colorado Desert specimens of an *Amarantus* '10 feet' high. A year later, when the rains were very scant, he collected mature specimens of this plant at the same place only 10 cm. (about 4 inches) high. This is the common experience of botanists in the desert, and to this fact, more than to the actual failure of certain species to germinate, is due the apparent scarcity of annual vegetation in a dry year.

When an annual plant is unable to obtain sufficient moisture for further vigorous growth, even if it has attained but a small proportion of its normal size, it flowers and begins to mature its fruit. If the same conditions continue, it accomplishes the final act of life by transferring its food supply to its seeds, and then perishes.

In the upper part of Surprise Cañon, Panamint Mountains, were found mature specimens of *Lepidium lasiocarpum* 11 mm. high, *Mimulus rubellus* 17 mm., *Draba caroliniana micrantha* 16 mm., *Piptocalyx circumcissus* 7 mm., and *Stylocline micropoides* 9 mm. No special effort was made to collect the smallest.

In a humid climate an important form of conserved moisture is dew, which is deposited upon the surface of the ground and rapidly absorbed into it. When we crossed the Mohave River, at Daggett, on January 6, 1891, early in the morning, frost was seen over a strip of ground a few rods wide along the stream. During the remainder of the expedition, neither dew nor frost was seen in the desert, although in the next two months perhaps one-half the nights were cold enough to freeze any dew that might have fallen. The weather observer in Death Valley, too, recorded no dew.

From the foregoing facts the principle is clear that the annual vegetation of the desert is supported by capillary moisture derived from local rainfall; and furthermore, that of the two phenomena, growth of annual vegetation and presence of capillary moisture in the soil, each is an index to the other as to beginning, quantity, and duration.

The subject of hygroscopic moisture is unfortunately one about which very little is known. It has been found that a mass of earth, kiln-dried and exposed to atmospheric air, absorbs from it a certain amount of moisture. According to the experiments of Schubler,[1] 1 kilogram of kiln-dried calcareous sand, exposed at a temperature of 12° to 15° C. to an atmosphere saturated with moisture, took up, in 72 hours, 3 grams of water; the same amount of pure blue clay, under identical conditions, took up 49 grams; and humus, 120 grams.

The amount that would be absorbed by various soils in the dry air of Death Valley would be much less, yet it is believed to be of very great importance in the economy of desert perennial vegetation. Whether or not a plant can abstract a sufficient amount of water for its continued existence from hygroscopic moisture alone, in any soil, can be determined only by experiment. From several months' observation of desert conditions and phenomena, it appears to the writer extremely probable that a very important proportion, if not indeed in some cases all, of the summer water supply of certain desert shrubs is conserved in such a manner.

TEMPERATURE.

The observations on the temperature of Death Valley in 1891 for the hottest month of the year, July, show an average daily maximum of 116°, an average daily minimum of 87° and a mean of 102° F. A maximum temperature of 122° occurred five times during the summer. Although this maximum has been exceeded in a few instances in India and in the Colorado Desert of California, the average temperatures given above are considerably in excess of any averages recorded in India, the Sahara, or at any other point in our own deserts. Moreover, these temperatures were taken under cover of a shelter constructed especially to eliminate the effect of radiation from the ground. The temperature in the shade under normal conditions is therefore a few degrees higher; and in direct sunlight bodies that readily absorb heat must reach a temperature many degrees in excess of the recorded maximum.

The only accessible records of the winter temperature in Death Valley are those kept by the expedition at Bennett Wells in January and February, 1891. The lowest observed temperature was 30° F., and it was not unusual for thin ice to form on water left over night in camp utensils. A yearly range of 92° obtained from these records is doubtless several degrees too low. The average daily range during August was 32°, which is unusually large. The observed range for our second day at Bennett Wells was from 73° to 31°, a difference of 42°. Such a range is undoubtedly not infrequent in Death Valley. That plants must be especially adapted to endure such wide variations in temperature, has been pointed out by Dr. J. T. Rothrock;[1] but these modifications are so associated with adaptations to lessen transpiration that the two cannot, with our present knowledge, be clearly distinguished.

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[1] Cited in Sachze's Lehrbuch der Agriculturchemie, p. 208 (1888).

SEASONS.

In the temperate zone, as for example in the latitude of New York, the year is divided into two well-defined seasons, summer and winter, characterized respectively by a high and a low degree of temperature. The behavior of the accompanying flora is directly related to these seasonal changes. In summer the vegetation is luxuriant, in winter dormant. In many tropical regions the seasons are characterized by only comparatively slight differences in temperature, the cold being at no season so great as to stop the growth of vegetation. The period of growth in such a region usually follows the season of rainfall, as distinguished from the season of drought.

In Death Valley and the adjacent deserts occurs a combination of temperate and tropical seasons which, although not so unvarying as the winter and summer of a northern latitude, have sufficient individuality to admit of fair characterization. They are (1) a period of combined moisture and heat from February to May; (2) a period of drought from June to November; (3) a period of cold during December and January. During the first season, which we may call spring, the principal growth of vegetation takes place; during the second season, or summer, the vegetation assumes a state of rest necessitated by the extreme dryness of the atmosphere and soil; and during the third or winter season, although sufficient moisture is often present, growth is minimized on account of the severity of the cold.

CLASSIFIED LIST OF DESERT PLANTS.

A reference list has been prepared which contains only the plants found actually in the Lower Sonoran zone of the desert. Weeds are omitted.

The whole number of species has been divided into two classes: first, those of HUMID HABITAT, which are subdivided into (1) *aquatic*, growing in water, and (2) *paludose*, growing in wet soil; and secondly, those of ARID HABITAT, which also are subdivided into (1) *rupestrine*, growing in cañons and on rock-sheltered slopes, and (2) *campestrine*, growing on mesas, washes, sand-wastes, and clayey valley-bottoms. In each of the four groups thus constituted the species are set down in four columns containing respectively trees, shrubs, perennials, and annuals. All herbaceous plants which live through more than one summer are here included among the perennials.

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[1] Report upon United States Geographical Surveys West of the One Hundredth Meridian, in Charge of First Lieut. Geo. M. Wheeler. Vol. vi., Botany, 1878, p. 4.

LIST OF DESERT PLANTS.

OF HUMID HABITAT.

AQUATIC.

Trees.	Shrubs.	Perennials.	Annuals.
(None.)	(None.)	Azolla caroliniana. Chara fœtida. Lemna valdiviana. Naias marina. Rorippa nasturtium. Ruppia maritima. Zannichellia palustris.	(None.)

PALUDOSE.

Fraxinus coriacea. Populus fremontii. Prosopis juliflora. Prosopis pubescens. Salix nigra venulosa.	Adelia parvifolia. Allenrolfea occidentalis. Atriplex lentiformis. Atriplex parryi. Atriplex torreyi. Baccharis emoryi. Baccharis glutinosa. Baccharis sergilioides. Chilopsis saligna. Coleosanthus longifolius. Pluchea sericea. Salix longifolia. Salix longifolia exigua. Vitis californica.	Adiantum emarginatum. Andropogon macrourus. Anemopsis californica. Aplopappus racemosus virgatus. Apocynum cannabinum. Asclepias mexicana. Asclepias speciosa. Aster carnosus. Berula erecta. Bigelovia veneta. Cladium mariscus. Cressa cretica. Cyperus lævigatus. Distichlis spicata. Eleocharis rostellata. Elymus triticoides. Epipactis gigantea. Equisetum robustum. Equisetum variegatum. Eragrostis purshii. Fimbristylis thermalis. Glycyrrhiza lepidota. Imperata hookeri. Iva axillaris. Juncus balticus. Juncus cooperi. Juncus nodosus. Juncus xiphioides. Kochia americana. Lythrum album. Mimulus luteus. Nitrophila occidentalis. Oxytænia acerosa. Phragmites vulgaris. Pluchea camphorata. Potentilla eremica. Ranunculus cymbalaria. Schœnus nigricans. Scirpus americanus. Scirpus lacustris occidentalis. Scirpus maritimus. Scirpus olneyi. Scirpus nevadensis. Sesuvium portulacastrum. Sisyrinchium bellum. Solanum douglasii. Solidago spectabilis. Spartina gracilis. Sporobolus airoides. Sporobolus asperifolius. Sporobolus depauperatus. Statice limonium. Suæda suffrutescens. Typha angustifolia.	Aristida bromoides. Atriplex argentea. Atriplex phyllostegia. Conyza coulteri. Erythræa exaltata. Erythræa nuttallii. Helianthus petiolaris. Heliotropium curassavicum. Juncus bufonius. Polypogon monspeliensis. Trisetum barbatum.

LIST OF DESERT PLANTS—Continued.

OF ARID HABITAT.

RUPESTRINE.

Trees.	Shrubs.	Perennials.	Annuals.
(None.)	Aplopappus cuneatus. Bigelovia teretifolia. Coleosanthus atractyloides. Echinocactus wislizeni lecontei.	Arenaria macradenia. Cheilanthes myriophylla. Eucnide urens. Galium stellatum. Hofmeisteria pluriseta. Cryptanthe racemosa. Nicotiana trigonophylla. Notholæna parryi. Œnothera cardiophylla. Physalis crassifolia.	Macrocalyx bipinnatifidus. Macrocalyx membranaceus. Macrocalyx micranthus. Parietaria debilis. Pterostegia drymarioides.

CAMPESTRINE.

Yucca arborescens. Yucca macrocarpa.	Acamptopappus sphærocephalus. Amphiachyris fremontii. Aplopappus interior. Aplopappus monactis. Aster mohavensis. Atriplex canescens. Atriplex confertifolia. Atriplex hymenelytra. Atriplex polycarpa. Bigelovia graveolens. Bigelovia mohavensis. Bigelovia paniculata. Cassia armata. Cereus engelmanni. Coleogyne ramosissima. Dalea fremontii. Dalea polyadenia. Echinocactus polyancistrus. Echinocactus polycephalus. Encelia farinosa. Encelia frutescens. Ephedra nevadensis. Ephedra trifurca. Eurotia lanata. Franseria dumosa. Franseria eriocentra. Grayia spinosa. Hymenoclea salsola. Krameria canescens. Krameria parvifolia. Larrea tridentata. Lepidospartum squamatum. Lupinus ornatus. Lycium andersonii. Lycium cooperi. Mamillaria deserti. Mamillaria tetrancistra. Menodora spinescens. Opuntia basilaris. Opuntia echinocarpa. Opuntia ramosissima. Peucephyllum schottii. Phoradendron californicum. Rhus trilobata. Salazaria mexicana. Sarcobatus vermiculatus. Senecio douglasii. Sphæralcea munroana. Stanleya pinnata.	Arctomecon californicum. Arctomecon merriami. Baileya multiradiata. Bebbia juncea aspera. Bœrhavia annulata. Carduus ochrocentrus. Cladothrix oblongifolia. Coldenia plicata. Cucurbita palmata. Cucurbita fœtidissima. Eriogonum inflatum. Euphorbia polycarpa. Gutierrezia microcephala. Helianthella argophylla. Kochia californica. Lepidium fremontii. Mirabilis lævis. Oryzopsis membranacea. Palafoxia linearis. Petalonyx nitida. Petalonyx thurberi. Phacelia perityloides. Porophyllum gracile. Psathyrotes ramosissima. Psilostrophe cooperi. Ptiloria exigua. Rumex hymenosepalus. Sieglingia pulchella. Stanleya elata. Stipa viridula.	Abronia turbinata. Abronia villosa. Achyronychia cooperi. Amsinckia tessellata. Anisocoma acaulis. Antirrhinum filipes. Atrichoseris platyphylla. Biscutella californica. Calycoseris parryi. Chænactis attenuata. Chænactis carphoclinia. Chorizanthe brevicornu. Chorizanthe perfoliata. Chorizanthe rigida. Chorizanthe watsoni. Cleome sparsifolia. Cleomella obtusifolia. Coldenia brevifolia. Cryptanthe angustifolia. Cryptanthe cycloptera. Cryptanthe holoptera. Cryptanthe intermedia. Cryptanthe micrantha. Cryptanthe ramosissima. Cryptanthe submollis. Cuscuta californica. Dalea mollis. Dicoria canescens. Dipetalia subulata. Draba sonoræ. Emmenanthe penduliflora. Encelia eriocephala. Eremiastrum bellioides. Eremiastrum bellioides orcuttii. Eriogonum angulosum. Eriogonum baileyi. Eriogonum brachyanthum. Eriogonum insigne. Eriogonum reniforme. Eriogonum thomasii. Eriogonum trichopes. Eriophyllum ambiguum. Eriophyllum lanosum. Eriophyllum pringlei. Eriophyllum wallacei. Erodium cicutarium. Eschscholtzia minutiflora. Euphorbia setiloba. Festuca microstachys. Filago californica. Gilia filiformis. Gilia floccosa. Gilia latifolia. Gilia leptomeria. Lepidium flavum.

LIST OF DESERT PLANTS—Continued.

OF ARID HABITAT—Continued.

CAMPESTRINE—continued.

Trees.	Shrubs.	Perennials.	Annuals.
	Tetradymia comosa.		Lepidium lasiocarpum.
	Tetradymia glabrata.		Leptosyne bigelovii.
	Tetradymia spinosa.		Lesquerella gordoni sessilis.
	Thamnosma montana.		Linanthus demissus.
	Viguiera reticulata.		Linanthus dichotomus.
			Linanthus jonesii.
			Lupinus brevicaulis.
			Lupinus pusillus.
			Lygodesmia exigua.
			Malacothrix glabrata.
			Malacothrix sonchoides.
			Malveopsis rotundifolia.
			Marilaunidium demissum.
			Mentzelia albicaulis.
			Mentzelia reflexa.
			Mohavea breviflora.
			Navarretia matthewsii.
			Navarretia schottii.
			Navarretia setosissima.
			Navarretia setosissima punctata.
			Nemacladus ramosissimus.
			Nemoseris neomexicana.
			Œnothera alyssoides.
			Œnothera brevipes.
			Œnothera scapoidea.
			Œnothera scapoidea purpurascens.
			Œnothera refracta.
			Oxystylis lutea.
			Oxytheca perfoliata.
			Pectocarya linearis.
			Pectocarya setosa.
			Perityle emoryi nuda.
			Phacelia crenulata.
			Phacelia fremontii.
			Phacelia hispida brachyantha.
			Phacelia ivesiana.
			Phacelia pachyphylla.
			Phacelia pedicellata.
			Phacelia pulchella.
			Phacelia rotundifolia.
			Piptocalyx circumscissus.
			Plantago patagonica gnaphaloides.
			Psathyrotes annua.
			Salvia carduacea.
			Salvia columbariæ.
			Senecio mohavensis.
			Sisymbrium canescens.
			Sonnea jonesii.
			Streptanthus longirostris.
			Stylocline micropoides.
			Syntrichopappus fremontii.
			Thelypodium cooperi.
			Thysanocarpus curvipes.
			Uropappus linearifolius.

GENERAL ADAPTATIONS.

Before examining the adaptive peculiarities of the desert flora, it is necessary to expunge those species which are not subjected to true desert conditions. Aquatic and paludose plants, by their situation in constant proximity to water, have not been compelled to modify their structures conspicuously along the same lines as the arid vegetation of the desert, and do not represent its true flora. We shall therefore exclude all such plants from consideration unless specific reference is made to them, and confine the discussion to the dry-land, or true terrestrial, vegetation.

The absence of trees is the most conspicuous general feature of the vegetation. On some of the higher desert ranges, as the Charleston, Panamint, and Inyo, occur caps of coniferous timber, which have an abrupt lower limit. When seen from a distance of many miles, the line appears quite horizontal and clearly defined; above it there are forests, below it the naked mountain slopes. The winter storms afford a suggestive fact in explanation. Three or four times in the winter of 1891, when the air cleared after a long rain and the clouds broke away about the mountain tops, the new fall of snow could be seen lying along the mountain crest with a lower limit as level as if laid down along a straight-edge, the line of snow corresponding with the lower limit of trees. Below this altitude the precipitation was in the form of rain, and could not therefore be stored for the future needs of forest vegetation. Under extraordinary conditions snow may fall at lower altitudes, but it always melts away after a few hours' exposure to sunlight. The general statement may be made that in the desert mountains timber does not grow below the winter snow line, a condition clearly due to lack of moisture.

These conditions of treelessness and scant moisture exist throughout the desert, the former resulting from the latter. It is probable that the combined amount of foliage produced by all the shrubs on an acre of desert surface is not greater than that afforded by a single tree of the ordinary humid-region type. If the moisture absorbed by all these plants could be concentrated for the use of one tree it could undoubtedly live. But the support of a root-surface sufficiently great to absorb all the moisture from such an area of ground would be an unbearable tax upon the vital resources of any tree, and therefore none, of the ordinary type, have succeeded in adapting themselves to this region.

The tree yucca, *Yucca arborescens*, is the nearest approach to a real tree that the desert affords, often attaining a height of 6 to 7.5 meters, with a trunk 0.5 meter in diameter. Even this arborescent plant and its relative, *Yucca macrocarpa*, are, however, confined to the high altitudes of the desert, just below the lower limit of coniferous trees.

It is in the shrubby vegetation of the desert that the arid character of the region is most conspicuously reflected. Size, spacing, and form of desert shrubs may be taken as their general characteristics.

The height of *Larrea tridentata*, the largest of the desert shrubs, is commonly from 1 to 1.5 meters, while that of *Franseria dumosa* is about 0.3 meter. Between these limits the height of nearly all the other desert species ranges. In situations of extreme aridity the scale is slightly decreased, and in soil unusually well adapted to the needs of the vegetation the size of the plants somewhat exceeds these limits.

The scantiness of the desert vegetation possesses more significance than has ever been attributed to it. Except in rare instances the individual shrub is separated from its nearest neighbor by a distance of several meters. Never do they stand so close together as to crowd or shade each other. The distance from plant to plant varies with the aridity of the soil and is determined by it. Only so many individuals grow over a given area as can be supplied with moisture from it. In a humid climate the individual plants, whether trees, shrubs, or herbs, grow close together and by reason of the shade thus produced tend to deprive each other of light and of heat. The result is an active competition of both individuals and species for these necessaries of life. Between the separated individuals of the desert, however, no shade is produced, and they carry on, therefore, no struggle against each other for heat and light.

It is evident therefore that desert shrubs essentially present in their environment the anomaly of a struggle for existence, not against other plants, but against nonorganic physical forces alone. This fact makes the study of their adaptations especially interesting and instructive, for one element in the usual complexity of environment is removed, and we are able to perceive the simple influence of climatic and soil conditions.

The form of desert shrubs is the immediate outcome of their spacing. Surrounded on all sides by light, they develop in every direction equally. The resultant form is rounded or globular, a type from which there is almost no departure. In a shaded situation a light-loving plant, in order to obtain sufficient light, must grow tall enough to reach above the shading body, and in doing so necessarily loses, or fails to to develop, a rounded outline. A creeping shrub or a cone-shaped shrub is unknown in the desert. Many species have a well-defined trunk and present the appearance of miniature trees, while many others have only the group of stems characteristic of ordinary shrubs. *Peucephyllum schottii* is typical of the first of these forms, *Larrea tridentata* of the second. These two shrubs exhibit also a diversity in individual maturity which is worthy of record. A vigorous specimen of *Peucephyllum* commonly attains a height of 1.25 meters and has a trunk 7.5 to 10 cm. in diameter. Sooner or later, becoming incapable of carrying on the functions of vitality, it dies. Such a termination of life is common to all our ordinary forest trees. They have no provision for indefinitely continued existence. An individual of *Larrea*, however, never dies unless by some accident. As each one of the several stems grows older it bends forward toward the ground and finally dies, being replaced by a younger vigorous stem in the center of the group. The relation between these two types of shrub is precisely analagous to that which exists between herbaceous annuals and perennials.

Perennial herbs are fewer in number than either shrubs or annuals. Of the thirty recorded in the list, only three, *Cucurbita palmata*, *C. fœtidissima* and *Rumex hymenosepalus*, have stems that die to the ground each year; three are grasses that remain more or less green throughout the winter; and the remainder are suffrutescent at the base. This latter character is one of the most important in the history of desert perennials. In a humid temperate climate the typical perennial has a stem and leaves of soft herbaceous texture, which, at the approach of winter, die to the ground. The underground portions, protected from cold and not subjected to drought, are well adapted to carry the life of the plant through the winter. In regions of somewhat less aridity than the desert, such as the plains of western Kansas, eastern Colorado, and central California, the typical perennial is one with greatly enlarged underground parts, capable of withstanding a long season of drought. To this type belong the three plants that are mentioned above, *Cucurbita palmata*, *C. fœtidissima* and *Rumex hymenosepalus*, and many liliaceous plants, such as *Chlorogalum*, *Brodiæa*, and *Calochortus*, common in central California. But even such a provision against the effects of aridity appears to be insufficient for most plants in the Mohave Desert, and the adaptation generally successful is the maintenance, throughout the dry season, of a slow rate of transpiration. This is effected through the suffrutescent living lower portion of the stem. In none of the perennials of this type listed above is there a conspicuous enlargement of the roots for the storage of water. The adaptation for a minimum but continued transpiration seems to be entirely adequate for the needs of the case. It is to be remarked, therefore, that these suffrutescent perennials are functionally shrubs, as distinguished from true perennials and from annuals. With the exception of the three perennials already mentioned and the three grasses, whose status is somewhat uncertain, the arid vegetation of the Mohave Desert region may be treated as made up of shrubs and annuals.

The list of annuals is large, and in their types of form they do not appear peculiar. A few are prostrate, as *Dalea mollis* and *Achyronychia cooperi;* many diffusely branched, like *Nemacladus ramosissimus* and *Cleomella obtusifolia;* and many others erect and little branched, for example *Encelia eriocephala* and *Œnothera brevipes*. An annual is well adapted for life in this desert, because it confines its period of growth to the rainy season, when the climate is not extraordinarily arid, and at the approach of summer dies, only the ripened seeds living through the summer and winter.

SPECIAL ADAPTATIONS.

In turning now to examine the minuter structural characters of the desert flora, one finds among the annuals little that is remarkable. Their leaf surface is well developed, many have soft herbaceous foliage, none have thick succulent leaves, and comparatively few have marked modifications to prevent rapid transpiration; yet some adaptive characters may be detected. A few species are canescent with a close covering of hairs (*Dalea mollis*, *Plantago patagonica gnaphaloides*, *Psathyrotes annua*, and others), and many (as *Abronia villosa*, *Mohavea breviflora*, and *Phacelia crenulata*) bear viscid-glandular hairs.

It is in the shrubs, however, which are subjected to all the seasonal changes of many years, that the most marked modifications occur.

There are several important stages in the life histories of plants, at any one of which, if an adverse or peculiar environment is presented, special adaptations are required in order to insure the continued efficient existence of the species. Perhaps the most important of these are the periods of reproduction, dissemination, hibernation, germination, and growth.

The process of reproduction seems to present in these plants about the same problems as in those of an ordinary climate. The customary methods of pollination, by insects (as in *Opuntia echinocarpa*) and by the wind (as in *Atriplex hymenelytra*), are found here as in other regions. A cursory view of these matters did not show that wind-pollination and self-fertilization were unusually prominent. Insects appear to be sufficiently numerous to accomplish all necessary floral visits.

The dissemination of seeds and fruits presents a wide range of adaptations. The wind is enabled to distribute the achenia of many compositæ (*Aster mohavensis*, *Tetradymia spinosa*, etc.) by reason of their finely divided pappus; the fruits of *Larrea* and *Eurotia* by the long divergent hairs on their surfaces; those of *Atriplex*, *Grayia*, and *Sarcobatus* by lamelliform enlargements of the involucre; and those of *Salazaria* by a bladdery inflated calyx. In none of these cases is the fruit buoyant enough to remain suspended in the air, but it is sufficiently light to be blown along the surface of the ground by an ordinary wind. In *Eriogonum trichopes* the stem breaks off at the base and the whole plant is blown over the desert as a tumble-weed. The fruits of *Krameria canescens*, *Franseria dumosa*, and *Petalonyx thurberi* are provided with barbed bristles, by which they may catch in the fur of animals and be transported to long distances. Only a few species produce fleshy fruits (*Lycium andersonii*, *Mamillaria tetrancistra*, and a few others). The fruits of *Opuntia*, which in less arid regions are often fleshy, are here all dry; and, in general, it is evident that the tendency is against the evolution of plants with pulpy fruits. This tendency undoubtedly results, not from any insufficiency of such a means of dissemination, but from the inherent difficulty of producing fleshy structures in so dry a climate. Modifications similar to those enumerated are found also among the annuals.

Hibernation is, in many types of vegetation and under many conditions of life, a period that demands the most perfect preparation. The death of the stem and the storage of food-material in underground structures in a typical perennial, and the resting of seeds before germination in annuals, are the two ordinary methods of herbaceous hibernation in humid temperate climates. The first provision is nearly unknown in the desert, because of the almost entire want of true perennials, while the second is, of course, the common and only method for the wintering of annuals. The hibernation of desert shrubs presents many remarkable features, but as it is intimately connected with the phenomena of growth it will be discussed under that head.

The germination of seeds in a desert is a subject that presumably presents some unusual features, yet the probability that germination takes place almost exclusively at rainy periods simplifies the matter very materially. It was, however, impossible to make observations in this line.

The problem of ordinary vegetative growth of desert shrubs must, from the nature of things, be more serious than any other in their life-history. Light and food are abundant, but moisture, both of soil and air, is far too little for the usual needs of vegetation.

A plant absorbs moisture from the soil through its roots, carries it along its stem, and transpires it by evaporation from the stomata of the leaves. Transpiration is an absolute necessity in the growth of a plant, for upon it depends directly the performance of several of the vital functions. If a plant of ordinary structure, such for example as red clover, were exposed to the climatic conditions of the desert it would wilt, dry up, and die. To speak in physiological terms, the hot, dry air has caused more water to be transpired from the leaves than the roots can supply, the soft tissues have lost their turgescence, and the dependent vital functions have ceased. The first theoretical necessity of the plant is that the water it absorbs from the ground shall practically equal in amount that which it transpires. Desert shrubs accomplish this by the reduction of transpiration and by the increase of means for absorption.

A specimen of *Opuntia echinocarpa*, growing on the open mesa in the vicinity of Daggett, was examined to ascertain to what extent its root system had developed. The main root divided itself, close to the base of the stem, into horizontal branches. One of these, 8 mm. in diameter at the base, was traced to the distance of 2.64 meters when it broke at a diameter of 1.5 mm. Its distance beneath the surface varied from 5 to 10 cm., and many smaller roots branched off from it. The plant had eight roots as large or larger than this one, two of them 1.6 cm. in diameter at the base, and several smaller ones.. The aerial part of the plant consisted of two branching stems, each 48 cm. high. The root surface of this plant, it may be seen, is remarkably large in comparison with the height of the stem. It should be remembered, too, that the stems and branches of this plant are cylindrical, about 2.5 cm. in diameter, and, except for the minute leaves that are present for a few weeks in spring, devoid of foliage. Furthermore, the surface of the branches is conspicuously cuticularized. The transpiratory system of the plant is exceedingly restricted, compared with the absorptive surface of the root. In this particular case the roots, from their horizontal position near the surface of the ground, are evidently adapted to take up surface moisture. Such a provision does not appear, however, to be general among the plants of the Mohave Desert, in which dew rarely or never falls, although it is reported to be a common adaptation in the deserts of Arabia, where dewy nights are frequent.[1]

The roots of *Prosopis juliflora* grow to enormous lengths. In the dry bed of the Amargosa River, between Salt Wells and Saratoga Springs, Death Valley, was seen a root of this tree, which had been washed out by a torrent, 15.8 meters in length. Its diameter at the smaller end was about 1.5 cm., at the larger about 3 cm., and it bore no lateral branches. A cortex of unusual thickness is present in the roots of many of the desert shrubs.

During the season of drought the largest amount of moisture that the roots can by any possibility absorb is comparatively small, and the greatest burden of modification must fall on the transpiratory system.

Before presenting a general consideration of the methods of reducing transpiration we shall examine several shrubs, to find what particular modifications each has undergone to this end.

Acamptopappus sphærocephalus.—The stem is of slow growth and the bark white, thin, and spongy. The leaves are oblanceolate-linear, reaching 1.5 cm. in length, thick, green, with glabrous or sometimes scabrous surfaces. The short, stiff hairs that are sometimes present appear in their young state to be slightly resiniferous.

Amphiachyris fremontii.—A stem 2.5 mm. in diameter, in addition to the bark, shows six annual rings. The wood is hard, the bark about 1 mm. thick and composed of soft, dirty-white, pith-like tissue. The leaves, which are deciduous, are from 5 to 10 mm. long, green in color, and scabrous with short hairs, some pyramidal-acuminate and pointed, others gland-tipped.

Aplopappus interior.—One stem 6 mm. thick is 5 years old. The bark when old becomes dark gray, and has a spongy, slightly fibrous structure. The linear-oblanceolate leaves are thick, glabrous, and impressed-punctate with numerous resin-glands. Three resin-passages run lengthwise through the leaf, as in *Bigelovia teretifolia.*

Aplopappus monactis.—The bark is pale brown and more fibrous than in *A. interior,* while the wood has about the same texture and rate of growth as in that plant. Each year's growth has a length of from 6 to 10 cm. The leaves are similar in form and structure to those of *A. interior,* but they bear in addition scattered, short but flexuous hairs, each consisting of a single filiform cell attached to the epidermis through the medium of another short, constricted cell.

Aster moharensis.—The bark is similar in color, texture, and structure to that of *Amphiachyris,* but often 1 mm. thick. The annual rings of wood are difficult to count.

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[1] Volkens: Die Flora der Ægyptisch-Arabischen Wüste, p. 24 (1887).

The leaves are variable in size, form, and area of surface, often reaching a length of 5 cm. and a width of 1 cm. They are green in color, and are provided scantily in varied proportions with two kinds of hairs—one long, curled, and several-celled; the other short, made up of two or three columns of cells, and surmounted by a thick, spherical gland. Each column contains from one to three short cells, placed end to end. In the axils of many of the leaves are buds, evidently prepared for development during the following year, which are densely woolly with the hairs of the kind first described.

Atriplex confertifolia.—The wood and bark are similar to those of *Amphiachyris.* The leaves have an area, on either surface, of 0.5 to 1 sq. cm. The netted, partly anastomosing veins of the leaf are densely coated with cells full of chlorophyll, while the cells of the intervening spaces contain very little. Stomata are abundant on both surfaces of the leaf, and a thick coating of large, thin-walled, bladdery cells closely covers and protects the epidermis. *Atriplex canescens, A. hymenelytra,* and *A. polycarpa* are all characterized by leaves of large surface-area and similar modifications.

Bebbia juncea aspera.—The stem wood is soft, with the annual rings indistinguishable and the pith large. The thick, filiform-linear leaves are scabrous with appressed, short, stiff-pointed hairs.

Bigelovia teretifolia—The wood is hard and of slow growth, but the rings difficult to distinguish; while the bark is like that of *Amphiachyris.* The leaves are narrowly linear, thick, and semiterete. They have no pubescence, but are covered with pits, at the bottom of each of which is a resin-gland. Three resin-passages run longitudinally through the leaf.

Cassia armata.—The stem is green, striate, apparently glabrous, and evidently performs for several years the function of transpiration. The wood is thin, the pith large, and the annual rings indistinguishable. The epidermis of the stem is covered by a dense coating of short, thick, unicellular, club-shaped hairs, each of which is reflexed and appressed to the stem. This hairy coating resembles in miniature a roof covered with cylindrical tiles. Occasionally one of the hairs is conspicuously larger than the others and possesses the remarkable character of containing chlorophyll. Stomata are present in the epidermis. The rachis of the compound leaf is about 5 cm. long, and reaches a thickness of 2 mm. and a breadth of 2.5 mm. In transection the rachis is seen to be made up of chlorophylless, pith-like tissue, bearing on its outer surface, beneath the epidermis, a thin layer of chlorophyllose cells. The rachis bears a few pairs of small, deciduous leaflets, which, like the rachis itself, are glabrous or bear a very few appressed, short, cylindrical hairs.

Cereus engelmanni.—This is similar in its structure to *Echinocactus polycephalus,* but the stem is cylindrical instead of globular, and bears no woolly hairs at its apex.

Dalea fremontii.—The leaflets are generally oblong in outline, 5 to 10 mm. long, thick, and moderately pubescent, with appressed silky hairs, which, while the leaflets are young, form a dense covering over them. Imbedded in the substance of the leaf are scattered resin-glands. The leaflets appear to be early deciduous.

Dalea polyadenia.—The stems are of slow growth, and very little thickening takes place in the bark. The epidermis of the stem is densely covered with a coating of retrorsely appressed, short, straight hairs, among which are interspersed large, sessile resin-glands. The deciduous compound leaves are covered, but less densely, with similar hairs and glands.

Echinocactus polyancistrus is modified in a manner similar to *E. polycephalus,* except that the stems grow singly and bear no woolly hairs at their apices.

Echinocactus polycephalus.—This cactus grows in sessile groups made up of a few globular, ribbed, chlorophyllose stems without foliage. The thick epidermis is glabrous and the interior of the stem very mucilaginous. The growing, depressed apex of the stem is covered with a mass of long, white, implexed woolly hairs, which drop away as the parts become older.

Encelia farinosa.—The wood of old stems is moderately hard, but the annual rings are indistinguishable. The bark is closer and more compact than in any of the other plants hitherto described. The leaves are large, ovate, sometimes 8 cm. long, and are provided with a thin, close covering of unicellular, simple, entangled hairs.

Encelia frutescens.—The leaves, which are similar in form to those of the last species, but smaller, have a rather scant covering of slightly appressed, sharp-pointed, thick-based, stiff hairs, each composed of 3 to 5 cells.

Ephedra nevadensis and *E. trifurca.*—Like all the other species of the genus, these plants have no herbaceous leaves, but carry on transpiration by means of the epidermis of the stem. That organ is devoid of any hairy coating but is conspicuously cuticularized.

Eurotia lanata.—The linear-oblong leaves are covered on both faces by a coat of loose, stellate hairs.

Franseria dumosa.—The wood is hard and of slow growth, but the annual rings are indistinct. The bipinnatifid leaves and the young branches are coated densely by a series of overlapping straight, white, stiff, 2- to 5-celled hairs.

Grayia spinosa.—The wood of the branches is hard. The leaves when in the bud are densely covered with short, white hairs of a very peculiar pattern. They are unicellular, rather thick-walled, and much branched. The branches are short and thick and somewhat loosely interlocked, the mass formed by a single hair being nearly isodiametrical. As the leaf attains its full development in the spring, the hairs become separated so that they appear in abundance only at the apex of the leaf.

Krameria canescens and *K. parvifolia.*—The leaves and young shoots are covered with a dense white coat of unicellular, straight, slender, thick-walled hairs.

Larrea tridentata.—The leaves, when young, and the sepals, are coated with a silky covering of long, straight, white, appressed hairs. Later in the season the leaf is protected from desiccation by the resinous substance which pervades its tissues and often exudes on its surface.

Lycium andersonii.—The wood is hard and the rings indistinct. The small, oblanceolate leaves are glabrous and thick, and after accomplishing the various functions of assimilation in the spring months they turn yellow and drop off.

Lycium cooperi.—The wood is like that of the last species, and the leaves, of similar form but of larger size, are covered with short, glandular hairs.

Mamillaria deserti and *M. tetrancistra* have short, thick stems similar to those of *Echinocactus polycephalus*, but smaller and usually single.

Opuntia basilaris, O. echinocarpa, and *O. ramosissima.*—The first of these has flat, pad-like stems practically devoid of vegetative leaves, while the other two have cylindrical, areolate, branching trunks and rudimentary leaves that fall very early in the summer.

Peucephyllum schottii.—The leaves are 2 cm. or less long, glabrous, nearly terete, canaliculate along the upper side, punctate throughout with impressed glands, and usually exude a resinous substance.

Salazaria mexicana.—The wood is soft, one stem attaining a diameter of 4 mm. in four years. The epidermis of the young branches, which are green and assimilative, is canescent with a coating of pendant hairs similar to those of *Cassia armata.* None of the hairs, however, seem to be chlorophyllose, and their exposed portion is not so turgid as in the hairs of the *Cassia.* The leaves often present two surfaces of 1 sq. cm. each and are nearly glabrous, but show a scant evanescent remnant of hairs similar to those of the stem. They are early deciduous.

Sarcobatus vermiculatus.—The stems are white-barked when young, gray when older, have hard, greenish wood, and often attain a diameter of 4 mm. in two years. The leaves are nearly terete, fleshy, and glabrous.

Tetradymia comosa.—The stems, involucral bracts, and linear leaves of this shrub are whitened with an arachnoid but close and persistent pubescence.

Tetradymia glabrata.—The leaves are of two kinds, those borne on the shoots of the season, and those borne, fasciculate at the nodes, on one-year-old stems. The former are filiform-linear, longer than the others, acute at the apex, and bear an arachnoid pubescence. The others are shorter, obtuse, glabrous, and undoubtedly early deciduous.

Tetradymia spinosa.—The stems are covered with a close dense tomentum, and the pedicels and involucral bracts with arachnoid pubescence, while the primary leaves, which are transformed to slender spines, are at first arachnoid-pubescent, then glabrate, and the axillary-fasciculate leaves are glabrous or at first arachnoid.

Thamnosma montana.—The stem has a large pith and a thin layer of wood. The bark remains green, without thickening, for sometimes three or four years. Its surface is devoid of pubescence, but is roughened with blunt elevations, each containing an imbedded gland. The small leaves are linear-oblanceolate, glabrous, sparingly impressed-glandular, and very early deciduous.

Returning now to a topical review of the characters presented, I may remark, first, the small yearly growth of branches, both in length and thickness. This is such a common character of the shrubs previously enumerated, that it is scarcely necessary to mention particular cases. It is rare for a branch of a desert shrub to grow more than 10 cm. in a single season, and most of them grow far less. This character is to be considered a necessary outcome of reduced potential growth rather than a modification to lessen evaporation, yet it reciprocally produces that very effect.

Size, form, and thickness of leaves are points in which a striking community of modification is exhibited. Of the forty-one shrubs examined, only four, *Aster mohavensis*, *Atriplex hymenelytra*, and the two *Enceliæ*, have leaves whose single surface-area exceeds 1 sq. cm. Most plants of *Aster mohavensis* have leaves of much smaller area, and it is probable that all of them lose the power of transpiration early in summer. The other three plants have a specially modified protective epidermal covering, which compensates largely for their size. In the direction of minuteness in functionating leaves there is no limit, for in *Cereus* and *Echinocactus* they are entirely wanting, while in *Ephedra* they are represented by scales devoid of chlorophyll and so constructed as to preclude the possibility of transpiration. In such cases all the transpiration is carried on by the stem.

The form and thickness of the leaves of these shrubs are direct modifications for reducing the evaporating surface. Eight species have, as stated above, nontranspiring leaves, eighteen have entire leaves varying from filiform to linear-oblong, nine are entire and obovate to orbicular, while only seven have the ordinary form of an ovate, acuminate, toothed, or lobed blade. In this statement leaflets of compound leaves, such as those of *Cassia* and *Dalea*, are treated as single leaves. The tendency toward thickening of the assimilative leaves in this series of plants is conspicuous, and the resulting leaf is commonly of a fleshy texture. Not a single species bore a really thin leaf. These facts indicate a strong tendency toward simplicity and compactness of form.

The early falling of leaves in desert shrubs is a matter that has attracted little attention. In *Cassia armata*, *Lycium andersonii*, *Salazaria* *mexicana*, and *Thamnosma montana* nearly all the leaves drop away in early summer, soon after the long drought has begun to cut off the customary rain supply of the spring months. The most interesting feature of this phase of adaptation is the fact that in none of these four plants do the leaves possess the character of either a hairy, scaly, or resinous epidermis, nontranspiratory modifications to be described below. It seems that these leaves, pushing out from the bud with the spring rains, carry on for a few weeks a rapid transpiration; but at the advent of arid conditions they become powerless to continue such a rate of transpiration, and not being adapted for the minimum rate demanded by their new surroundings they dry up and drop away. It is probable that the few other smooth-leaved shrubs in the list have the same summer history, but I had no opportunity of observing them. In *Tetradymia glabrata* the axillary-fasciculate leaves, evidently early deciduous, are glabrous, while the primary, persistent leaves are permanently covered with arachnoid hairs. In the case of species whose leaves are deciduous, transpiration is carried on in summer through the epidermis of the stem, and necessarily there is in the latter organ an abundant supply of chlorophyll to permit the assimilation of food. *Cassia armata*, *Salazaria mexicana*, and *Thamnosma montana* are conspicuously thus provided with chlorophyll.

In the majority of plants, however, the leaves remain on the stems during the greater part of the summer, carrying on their functions. To confine transpiration to that minimum which alone it is possible for a plant in such environment to support, the surfaces of the leaves are protected either by a resinous exudate or by a close covering of dry hairs.

In *Larrea tridentata* is found the apparently simplest form of resinous coating. The leaves and small twigs are thinly spread with a covering that closely resembles in appearance ordinary shellac. To the abundance of this resinous matter the plant's popular name, creosote bush, is due, for in burning the green wood and leaves of *Larrea* a pungent odor is detected and a dense smoke arises. That the function of the coating is to minimize transpiration there can be no doubt, but the precise method by which this is brought about has not been ascertained. If it were simply by the complete mechanical varnishing of the leaf-surface, all transpiration would cease. It should be pointed out here that in winter, when we first became familiar with the creosote bush, its leaves were thoroughly varnished; but in June, when the spring growth had nearly ceased, the leaves appeared to have very little of the coating. There is in this fact an evident correlation between rapid transpiration and absence of resinous covering, and a similar correlation between slow transpiration and the presence of such a covering. Herbarium specimens of this plant seldom show conspicuously the resinous coating, since they are usually collected in the flowering season, apparently before the resin has fully developed.

A resinous exudate of doubtful origin is sometimes seen on the leaves of *Amphiachyris fremontii*, but in most cases such a substance, when it occurs in desert plants, is definitely associated with conspicuous glands. Seven of the shrubs in our list are provided with glands situated upon the surface of the epidermis or partly imbedded in the tissues. These shrubs are *Aplopappus interior*, *A. monactis*, *Bigelovia teretifolia*, *Dalea fremontii*, *Dalea polyadenia*, *Peucephyllum schottii*, and *Thamnosma montana*. In the species last named the glands are confined almost entirely to the stem and branches, and are found only very sparingly on the leaves. A similar condition of things exists in *Dalea polyadenia*. In the two species of *Aplopappus*, the *Bigelovia*, and *Peucephyllum* the glands are confined to the leaves. These two types of the distribution of glands are seen at once to be correlated with the functions of stem and leaf. Plants which rely principally upon their leaves for transpiration, have these organs more glandular than their stems, while plants in which the leaves drop off early, and which, therefore, are forced to transpire from their stems, have precisely the opposite provision. In three of these seven glanduliferous species, namely, in *Thamnosma* and the two species of *Dalea*, the contents of the glands do not exude over the surface of the adjacent tissues, and therefore only a portion of the surface is protected by the exudation. This fact suggests strongly the idea that in such cases some other function than the mere mechanical sheltering of the transpiratory surface must be ascribed to these glands. The elucidation of the problem is likely to be attained only by direct experiment.

Fourteen of our forty-one shrubs have a conspicuously developed hairy coating of the leaves or stems. They are *Cassia armata*, *Dalea polyadenia*, the four species of *Atriplex*, *Encelia farinosa*, *Eurotia lanata*, *Franseria dumosa*, *Krameria parvifolia*, *K. canescens*, *Salazaria mexicana*, *Tetradymia comosa*, and *T. spinosa*. A minute examination of the various types of hairs represented in these plants, while interesting and instructive from a purely histological standpoint, is not desirable here. The form of the individual hairs in most of the species is described in the list above, but the general important fact is that from almost any form of trichome there may be developed, under a desert environment, a close hairy covering, so constructed as to greatly reduce the amount of heat transmitted from the air to the plant. In general, the individual hairs of such a covering have no moist cell-contents, but are minute sacks or tubes of cellulose filled with air and closely felted together. The air contained in the cavities of the hairs and in the spaces between them constitutes an excellent nonconductor of heat. It is undoubtedly true also that the circulation of air through the interstices between the hairs is comparatively sluggish, and the extremely dry atmosphere is therefore admitted very slowly to the stomata and through them to the moist interior of the leaf. The preponderance of the coating on either the leaves or the stem is correlated, like the resinous exudate of glanduliferous plants, with the relative importance of the transpiratory functions of these organs.

I have not yet accounted for a certain scant hairiness that occurs in some of the desert shrubs. The leaves of *Aster mohavensis* and *Grayia spinosa* are described above as bearing a few scattered hairs. Although very different in form, they possess the characteristics that have been mentioned as common to the individual hairs of the densely coated species enumerated in the preceding paragraph. To repeat, they consist of dry cells containing only air, and they are adapted, therefore, to be non-conductors of heat. Scattered thinly over the surface of the leaf, however, they provide a very unimportant protection to it. If now a leaf in its young stage be examined, it is found, conspicuously in the case of *Grayia spinosa*, that the hairs attain their full size early, while the leaf is still very little expanded. In this stage of the leaf's development the small number of hairs is amply sufficient to cover it and to prevent the moisture of its tissues from evaporating. Later in the development of the leaf, during the period of rapid spring transpiration, when the epidermal tissues have become strong, the covering is not needed, and still later, in the arid months, the leaves dry and drop off. In several other desert shrubs of the deciduous-leafed type, the same character of hairiness is exhibited, and the same function is evident.

In connection with this subject of the protection of nascent organs I wish to point out the fact that scaly buds are almost unknown in these desert shrubs. The form of protection that has been described above, or some equivalent in epidermal modification, is almost universal in these plants. In a humid climate the familiar type of winter bud, both in trees and in shrubs, is a bud covered and protected by scales. Only in rare instances, for example in *Cornus florida* and the species of *Viburnum*, do the organs that constitute the outer covering of winter buds develop later into organs with other functions. In a large majority of cases the bud-covering is made up of scales which, after the bursting of the bud in spring, are incapable of further development and drop away. The typical leaf in a humid climate is large, thin, bright green, and provided with a film-like epidermis. The development of an indurated bud-scale, which has been exposed for months to wide extremes of temperature and sunlight, into such a delicate structure as that just described, is hardly compatible with the principles of leaf growth and is rarely accomplished. We have therefore in humid climates a sharp differentiation between bud-scales and foliage leaves. In the case of desert shrubs the same influencing conditions do not exist. The environment of the latter consists essentially of extremes in temperature combined with aridity of the atmosphere. The close, hairy coating of nascent leaves, which has been described above, and which exists all the more effectively in leaves that are permanently covered with hairs, is entirely adequate to resist these conditions; and since in spring and summer a similar covering, or at least an indurated epidermis, is required to protect the plant from excessive transpiration, the same structure is made to answer both purposes, and no differentiation of bud-scales is required.

A few genera of desert plants, *Ephedra*, *Cereus*, and *Echinocactus*, carry on transpiration through their stems only, and are protected by neither glands, resinous exudate, nor hairy covering. In *Ephedra* transpiration is reduced undoubtedly by a thickened and extremely impervious cuticle, aided by the mechanism of the stomata. In the other three genera, all belonging to the order Cactaceæ, there is likewise a marked thickening of the cuticle, together with a special modification of the interior tissues of the stem to retain water. If a leaf or stem of any plant not containing these water reservoirs be split, the organ is speedily dessicated, since the soft tissues exposed by the cutting are not adapted to resist the drying effect of the air. But if an *Echinocactus* stem be cut open, the outer layers of cells on the raw surface become dry and form an artificial coating. With this slight protection the interior tissues are capable of retaining their moisture, even in the plant press, for several weeks.

A few other adaptive characteristics of desert shrubs may be mentioned before the subject is dismissed. The prevailing type of wood is of a hard, close-grained texture, such as that of *Larrea* or *Sarcobatus*. There appears to be a general tendency for shrubs of slow growth to form harder, finer wood than those of rapid growth. In *Salazaria mexicana* and *Cassia armata*, however, we find as exceptions to this rule a large pith surrounded by a thin, soft layer of wood. These two plants and others like them I take to be species which, in a region with humid climate and cold winter, would develop herbaceous stems. In the arid climate of the desert they have followed the general tendency of the vegetation to persist alive through the winter, but they have still retained some of the structural characteristics of herbaceous stems.

The bark of those desert shrubs which transpire principally through their leaves is thickened, dry, and spongy, while that of transpiratory stems, such as *Thamnosma montana*, is usually reduced to an epidermis covering a green, chlorophyllose, assimilative tissue. These two types of bark are well adapted for their respective functions.

One function of hairy coverings must be passed with the barest mention, namely, prevention of extreme or rapid radiation. On account of the clearness and dryness of the desert atmosphere, unusually great radiation ensues after sunset, and the temperature of all objects on the surface of the earth is rapidly reduced. Often on the desert in winter, after working during a sunny afternoon in a warm and comfortable tent, we found ourselves within a few minutes after sunset chilled and shivering. We observed a frequent daily fall of temperature from 70° F. to a few degrees below the freezing point. In summer a similar daily range occurs, but with higher extremes. Such abrupt changes in temperature would be fatal to a growing plant of ordinary structure. It is undoubtedly true that the hairy covering, and perhaps also some other structural characteristics of desert shrubs, have the effect of mollifying these conditions. The subject is one that invites and requires experiment. It should be pointed out here that the depressed vegetation near timber-line on high mountains exhibits epidermal structures very similar to some of those which occur in the desert. The densely canescent *Lupinus breweri* and *Raillardella argentea* of the Mount Whitney region may be cited as examples. The temperature at these altitudes is seldom or never extremely high, but the conditions of clear air and consequent rapid radiation at night exist here precisely as in the desert. There can be no doubt that the primary function of these modifications has reference to the regulating of temperature rather than the regulating of moisture.

CATALOGUE OF SPECIES.

RANUNCULACEÆ.

Clematis ligusticifolia Nutt. in Torr. & Gr. Fl. i. 9 (1838). Type locality, "plains of the Rocky Mountains, in open and in bushy places, near streams."[1]

A *Clematis* without flowers or fruit was abundant along streams in several cañons of the Panamint Mountains. It is undoubtedly a form of this species.

Thalictrum alpinum L. Sp. Pl. i. 545 (1753). Type locality European.

Along Cottonwood Creek, White Mountains (No. 1806). This circumpolar species extends southward on the Atlantic side of the hemisphere to Anticosti and Newfoundland, and along the Rocky Mountain system to Colorado, Nevada, and Utah. It is now reported for the first time in California.

Thalictrum fendleri platycarpum Trelease, Proc. Bost. Soc. Nat. Hist. xxiii. 304 (1886). Type locality, "California."

This has been separated from *T. fendleri* as a distinct species[2] mainly on account of differences in the pubescence and in the sepals. It appears, however, that the form and texture of the sepals vary considerably in *T. fendleri*. The pubescence of New Mexican specimens of that species appears under a lens densely and minutely scaly or granulose, while the Californian plant appears glabrous with the exception of its gland-tipped hairs. A surface similar to this is possessed by most specimens of *T. fendleri* from Colorado. An examination of all these with a compound microscope shows that the apparent difference is one of degree, not of kind. In the Californian and Colorado plants the outer surface of each epidermal cell is only moderately convex, while in the New Mexican plant the surface has apparently protruded into a knob with a constriction at its base. So closely set are these knobs that they form a complete coating over the leaf surface. Between these two extremes all gradations may be found. On Frazier Mountain (No. 1204), and near Mineral King (No. 1387).

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[1] In quoting North American type localities a literatim copy of the original text is given, the only variation being in the non-capitalization of the initial letter, in a uniform use of Roman instead of italic letters, and in the omission of diacritic marks. If the work containing the original description could not be consulted, all reference to the type locality is omitted.

[2] Pitt. i. 166 (1888).

Anemone sphenophylla Poepp. Fragm. Syn. 27 (1833). Type locality, "in Chile boreal[i] collibus graminos[is] ad Concon."

Johnson Cañon, Panamint Mountains (Nos. 494, 500). This species appears never to have been collected in California before.

Pulsatilla occidentalis (Wats.) Proc. Amer. Acad. xi. 121 (1876), under *Anemone;* Freyn, Deutsch. Bot. Monats. viii. 78 (1890). Type locality, "in the mountains, from British Columbia southward to Mt. Shasta and Lassen's Peak."

Near Mineral King, Sierra Nevada (No. 1531.) This is the American representative of the Old World species *P. alpina.*

Ranunculus alismæfolius alismellus Gray, Proc. Amer. Acad. vii. 327 (1868). Type locality, "Lake Tenayo and on Mount Dana, Sierra Nevada, to the height of 12,000 feet."

Near Mineral King (No. 1567) and in Big Cottonwood Meadows (No. 2123), Sierra Nevada.

Ranunculus aquatilis trichophyllus (Chaix.) in Villars, Hist. Pl. Dauph. 336 (1786), as *R. trichophyllus;* Gray, Man. ed. 5. 40 (1867).

Our plant is the slender form with petiolate leaves, all submersed, the segments collapsing when drawn from the water. An elaborate discussion of the subgenus *Batrachium* has been published by Hiern.[1] He includes all the usually recognized species and varieties under one species, *R. hydrocharis* Spenner (1829), and separates the forms into thirty-five varieties. Of these the following eight occur in the United States, *lobbii, hederæfolius, cæspitosus, longirostris, trichophyllus, confervoides, drouetii,* and *submersus,* the varieties *lobbii* and *longirostris* being exclusively North American. Dr. Gray[2] in the latest revision of the American representatives of the group retained four species, *circinatus, aquatilis, hederaceus,* and *lobbii.*

To *R. circinatus* and *R. lobbii* Hiern's varieties *longirostris* and *lobbii* respectively belong, while *confervoides, drouetii,* and *submersus* appear to be referable to flaccid-leafed forms, *trichophyllus* to stiff-leafed forms, of *R. aquatilis trichophyllus.* Hiern's classification and nomenclature are in some respects contrary to principle, and their application to the American species cannot be considered satisfactory.

Observed in the Kern River, near Kernville; in a stream in Walker Basin; in ditches near Visalia; and in the Kaweah River, near Three Rivers (No. 1298). All these stations are in intramontane California.

Ranunculus cymbalaria Pursh, Fl. ii. 392 (1814). Type locality, "in saline marshes near the salt-works of Onondago, New York."

We found this plant near Keeler (No. 854); in Owens Valley (No. 1771); in Black Cañon, White Mountains (No. 1791); at several points between Lone Pine and Indian Wells; and on both slopes of Walker Pass.

Ranunculus oxynotus Gray, Proc. Amer. Acad. x. 68 (1874). Type locality, "California, near summit of Castle Peak, Sierra County, at 9,000 feet."

Near Mineral King, Sierra Nevada (No. 1534). This is a species peculiar to the high Sierra Nevada, growing a little below timber-line. It was abundant on the slope where the specimens were collected.

Aquilegia pubescens sp. nov. PLATE I.

Rootstock branching, about 5 or 6 mm. thick, densely clothed with dead leaf-sheaths; stem 20 to 30 cm. high, glabrous below, sparingly clammy-hairy near the inflorescence, few- (commonly 2- to 5-) flowered; radical leaves on slender, glabrous petioles 10 to 20 cm. long, simply ternate; leaflets (with petiolules 20 to 30 mm. long) 3-parted to 3-divided, the divisions sessile, cuneate-obovate, with two or three crenate lobes, minutely but densely pubescent beneath, somewhat less so above; stem-leaves single or none, similar to the radical leaves, passing into linear-tripartite bracts, with clammy-pubescent short and dilated petioles; flower canary-yellow; sepals linear-oblong, bluntly acute, 20 to 25 mm. long; petals with spur 35 to 40 mm., and blade 6 to 10 mm., in length; fruit not seen.

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[1] Seem. Journ. Bot. ix. 43–49, 65–69, 97–107, pl. cxiv., cxv. (1871).

[2] Proc. Amer. Acad. xxi. 363, 364 (1886).

Type specimen in the United States National Herbarium, No. 1513, Death Valley Expedition; collected August 6, 1891, at an altitude of about 3,000 meters in the Sierra Nevada, on a mountain-side north of the White Chief Mine, near Mineral King, Tulare County, California, by Frederick V. Coville.

This plant is nearly related to *A. chrysantha* and *A. cærulea*, differing in its smaller stature, densely sheathed rootstock, pubescent leaflets, and thicker spurs, and especially in its shorter petal blades. Nuttall's *Aquilegia leptalea* can not be, either from its locality or description, the same as this plant, but is undoubtedly identical with one of the species mentioned above. No intergrades have appeared. In the vicinity of the White Chief Mine, near Mineral King, there grew, along with this plant, a red-flowered, short-spurred columbine, supposed to be *A. truncata*, which appeared to hybridize with it. Unfortunately none of these plants were collected.

Aquilegia truncata Fisch. Mey. & Lalle. Ind. Sem. Petrop. ix. Supp. 8 (1844). Type locality, "in California, prope coloniam Ross [icam]."

This occurred in Johnson Cañon, Panamint Mountains; in the Inyo Mountains (No. 1778); and in the Sierra Nevada, along the East Fork of the Kaweah River (No 1371). It was usually found in cañons along streams, and although it had a wide range in altitude it was never seen below the Upper Sonoran zone. The Sierran specimens are more or less clammy-pubescent, while the others are entirely glabrous below the inflorescence.

Delphinium[1] **azureum vimineum** (Don) in Sweet, Brit. Fl. Gard. ser. 2. iv. t. 374 (1838), as *D. vimineum*; Gray, Bot. Gaz. xii. 52 (1887). Type locality, "probably either in Louisiana or Texas." Collected by Drummond.

Shepherd Cañon, Argus Mountains (No. 737).

Delphinium parishii Gray, Bot. Gaz. xii. 53 (1887). Type locality, "Agua Caliente, on the southeastern borders of California."

Frazier Mountain (No. 1203).

Delphinium pauciflorum depauperatum (Nutt.) in Torr. & Gr. Fl. i. 33 (1838), as *D. depauperatum;* Gray, Bot. Gaz. xii. 54 (1887). Type locality, "in the shade of pine woods in the Blue Mountains of the Oregon."

Near Mammoth, Mono County (No. 1817).

Delphinium scaposum Greene, Bot. Gaz. vi. 156 (1881). Type locality, "hill country between the Gila and San Francisco rivers," New Mexico.

Big Cottonwood Meadows, Sierra Nevada (No. 2128). The calyx is unusually pubescent.

Delphinium scopulorum subalpinum Gray, Bot. Gaz. xii. 52 (1887). Type locality not given; range "through the higher mountains of Colorado to those of E. Oregon."

Near Mineral King, Sierra Nevada (No. 1407), and in the valley of the South Fork of Merced River (No. 1845). The latter specimen is referred here with doubt.

Actæa arguta Nutt. in Torr. & Gr. Fl. i. 35 (1838). Type locality, "woods of the Oregon and its tributary streams."

Near Whitney Meadows, Sierra Nevada (No. 1701).

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[1] The specimens of *Delphinium* have been determined by Dr. B. L. Robinson.

Pæonia californica Nutt. in Torr. & Gr. Fl. i. 41 (1838). Type locality, "margins of bushy plains, and in the valleys of the mountains, in the vicinity [of] St. Barbara, Upper California."

San Bernardino Valley (Nos. 112, 120).

CALYCANTHACEÆ.

Butneria occidentalis (Hook. & Arn.) Bot. Beech. 340 (1840–41), under *Calycanthus;* Greene, Erythea, i. 207 (1893). Type locality not given. The plant was first collected, probably in California, by Douglas.

Along the Kaweah River (No. 1305).

BERBERIDACEÆ.

Berberis fremontii Torr. Bot. Mex. Bound. ii. 30 (1859). Type locality, as taken from Fremont's plant, "on the tributaries of the Rio Virgen, in southern Utah."

Found by the writer near Mountain Springs, Charleston Mountains (No. 376), and by Dr. Merriam in the Pahranagat Mountains, at Hungry Hill Summit, and in the Beaverdam Mountains and Santa Clara Valley. The last two stations are in Utah, the others in Nevada. The first two represent about the western limit of species in this region.

NYMPHÆACEÆ.

Brasenia purpurea (Mx.) Fl. i. 324 (1803), under *Hydropeltis;* Casp. in Engler & Prantl, Nat. Pfl. iii. abt. 2. 6 (1888). Type locality, "in aquis tranquillis Carolinæ inferioris et Provinciæ Tennassee." This is the *Brasenia peltata* of Pursh.

In one of the Kern River Lakes, Sierra Nevada (No. 1726). The name *Menyanthes nymphoides* was used for this plant in the year 1784 by Thunberg, Flora Japonica, p. 82, but merely because he considered it the same as the *Menyanthes nymphoides* of Linnæus, which is a *Limnanthemum.* The specific name *nymphoides* can not therefore be retained, since it was applied to *Brasenia* only by reason of a mis-identification. The name *Menyanthes peltata* does not occur in Thunberg's Flora Japonica.

PAPAVERACEÆ.

Platystemon californicus Benth. Trans. Hort. Soc. Lond. ser. 2. i. 405 (1835). Type locality Californian.

Tejon Mountains (No. 1193).

Arctomecon californicum Torr. & Frem. in Frem. Second Rep. 312 (1845). Type locality "in only a single station in the Californian mountains, on the banks of a creek."

This is not the plant described as *Arctomecon californicum* in the Botany of California, which is *A. humile.*[1] The true characters of *A. californicum* are given in the diagnosis following the description of *A. merriami. Arctomecon humile* differs from *A. californicum* in its smaller size throughout, capsules about half as long, less hairy leaves, fewer flower parts, white petals, dilated filaments, and the presence of a style. *A. californicum* has not been collected since 1844, and the recorded type locality (see above) is so general as to be almost valueless. Fremont did not mention the plant in his narrative, but by an interesting coincidence it is possible to name with probable certainty the place in which he found it. Mr. Vernon Bailey collected our specimens May 1, 1891, on the road between Cottonwood Creek and Vegas

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[1] The plant collected in 1874 in the vicinity of St. George, Utah, by Dr. C. C. Parry and redescribed by Dr. Gray in the Proceedings of the American Academy, xii, 53 (1876), as *A. californicum* Torr., with a figure, has since been described by the present writer as *A. humile.* See Proc. Biol. Soc. Wash. vii. 67 (1892).

Ranch, Lincoln County, Nevada (No. 1889). On the 3d of May, 1844, Fremont traveled over precisely the same ground, and, as the plant is very conspicuous, must have seen it, and undoubtedly collected it.[1]

The plant was found also by Dr. Merriam and Mr. Bailey at Bitter Spring, in the Muddy Mountains, and between Ash Meadows and Oasis Valley, both localities in Nevada.

Arctomecon merriami Coville, Proc. Biol. Soc. Wash. vii. 66 (1892). Type locality as given below. PLATE II.

"Plant apparently perennial, from a thick woody root, branching into a broad cæspitose tuft 10 cm. or less high; leaves cuneate-oblanceolate, 2 to 3 cm. long, tapering below into a margined petiole, tridentate at the truncate apex, glaucous, clothed with very long (about 1 cm.), white, spreading, flexuous, barbellate hairs; upper leaves sessile, often entire and acute or obtuse at the apex; peduncles several, erect, 20 to 35 cm. high, glabrous, glaucous, rarely with a bract (similar to the leaves) below; flower single, in bud inclined to nod; sepals usually 3, hairy like the leaves, caducous; petals usually 6, white, obcordate, 3 to 3.5 cm. long, deciduous; stamens very numerous; anthers 3 to 4 mm. long when wet; filaments slender, glabrous, some of them conspicuously broader above; ovary narrowly oblong, 1-celled, with 6 or 7 parietal placentæ; style about 1.5 mm. long and broad; stigma capitate and with a stigmatic line opposite each placenta; capsule linear-oblong, in our specimens 3.5 to 4.1 cm. long; valves splitting down at the apex for a distance of 8 mm.; seeds not seen.

"Type specimen in the United States National Herbarium, No. 1890, Death Valley Expedition; collected May 1, 1891, a few miles west of Vegas Ranch, Lincoln County, Nevada, by C. Hart Merriam and Vernon Bailey.

"This plant differs from *A. californicum* in its usually 1-flowered bractless peduncles, long-hairy sepals, white petals, longer dilated filaments, linear-oblong ovary and capsule (4 cm. long), and evident style. *A. californicum* has, on the other hand, 6- to 20-flowered, leafy-bracted peduncles, glabrous sepals, deep yellow petals, filaments of uniform width, obovoid ovary, sessile stigma, and ovate capsule about 1.5 cm. long.

"This beautiful poppy is dedicated to Dr. C. Hart Merriam as a token of his influence in the progress of geographic botany."

Fruiting specimens were found by Mr. Bailey in February on the mountain slope near the Resting Springs Mine, a point within the State of California, and by the writer, near the type locality, March 9, 1891 (No. 432).

Argemone platyceras Link & Otto, Ic. Pl. Rar. i. 85 (1828.) Type locality, "in Mexico, in Confre de Perote prope Hacienda de la Laguna."

Our plant has glaucous, densely prickly stems, leaves, calyx, and capsules, and white flowers. It occurred sparingly at many points in the Upper and sometimes in the Lower Sonoran, both in the desert and on the west side of the Sierra Nevada, between Walker Pass and Tehachapi Valley. Specimens were collected in Johnson Cañon, Panamint Mountains (No. 527).

Dendromecon rigidum Benth. Trans. Hort. Soc. Lond. ser. 2. i. 407 (1835). Type locality Californian.

Valley of Kaweah River (No. 1311). These specimens have the narrow leaves characteristic of the type form, and the shrub itself grows to the height of abou' meters. The flowers are 3 to 4 cm. broad and the capsules attain a length of 11

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[1] The label of the type specimen confirms this surmise. It reads: "Foun" for-place called Las Vegas, near the Rio Virgen in Southern Utah." Of the type . men only one complete capsule and a portion of another are preserved.

Eschscholtzia crocea Benth. Trans. Hort. Soc. Lond. ser. 2. i. 407 (1835). Type locality Californian.

Tehachapi Valley (No. 1115). Authenticated by E. L. Greene.

Eschscholtzia hypecoides Benth. Trans. Hort. Soc. Lond. ser. 2. i. 407 (1835). Type locality Californian.

Valley of the Kaweah River (No. 1322). Determined by E. L. Greene.

Eschscholtzia minutiflora Wats. Proc. Amer. Acad. xi. 122 (1876). Type locality, "from Northwestern Nevada to Arizona and Southern Utah."

Specimens of No. 519 have been examined by Professor Greene, who writes: "No. 519 is a well-known Eschscholtzia which we always put into *E. minutiflora*, though the type of that species is * * * smaller-flowered." The petals of these specimens are 5 to 10 mm. in length. Although originally described as with flowers three lines or less in diameter, and later[1] as with petals only one or two lines long, the petals of No. 51, King Survey, reach a length of 7 mm. The early flowers of robust specimens appear to be the largest.

This is the common and characteristic species of the southern portion of the Great Basin. It was observed first in Long Valley on the same day on which we entered Death Valley; in the Funeral Mountains, near Saratoga Springs, and in the cañon of Mesquite Spring (No. 334); near Resting Springs Mine; in the Vegas Wash; along the road between Towner's ranch and Ash Meadows; in Johnson (No. 519), Surprise, and Mill Creek cañons, Panamint Mountains; and in a cañon of the Inyo Mountains, near Swansea.

FUMARIACEÆ.

Bikukulla chrysantha (Hook. & Arn.) Bot. Beech. 320 (1839–40), under *Dielytra*. Type locality not specifically given. The specimens were collected by Douglas, probably near San Francisco or Monterey.

San Bernardino Valley (No. 41), and along the South Fork of Kern River (No. 1030). Dr. N. L. Britton has shown clearly that Adanson's generic name *Bikukulla* antedates both *Dicentra* and *Diclytra*.[2] The name *Capnorchis*, recently adopted for the genus, is earlier than the Species Plantarum of Linnæus.

Bikukulla formosa (Andr.) Bot. Repos. vi. t. 393 (1804), under *Fumaria*. Species described from plants cultivated in England; type locality unknown.

Near Mineral King, Sierra Nevada (No. 1410).

Bikukulla pauciflora (Wats.) Bot. Cal. ii. 429 (1880), under *Dicentra*. Type localities, "Scott Mountains, near snow," and "near Castle Lake," California.

Near Mineral King, Sierra Nevada (No. 1559).

CRUCIFERÆ.

Rorippa nasturtium (L.) Sp. Pl. ii. 657 (1753), under *Sisymbrium*; Rusby, Mem. Torr. Club, iii. No. 3. 5 (1893). Type locality,[3] "in Europa & America septentrionali ad fontes." The combination *Rorippa nasturtium* does not occur in Scopoli, as cited by Dr. Rusby, and appears to have been first used by the latter writer.

This, the common water cress, grew along ditches in the San Bernardino Valley; t Winter's ranch, Pahrump Valley; at Cottonwood Springs, Vegas Valley; at a ing near the old adobe house about 4 miles north of Keeler; along a stream in ker Basin; in Tehachapi Valley; at Willow Spring and Crane Lake in Antelope ey; and near Tejon Ranch.

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[1] Proc. Amer. Acad. xxii. 273 (1887).

[2] Bull. Torr. Bot. Club, xviii. 266.

[3] L. Sp. Pl. ii. 657 (1753).

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Barbarea vulgaris R. Br. in Ait. Hort. Kew. ed. 2. iv. 109 (1812). Type locality European.

Although this plant usually occurs in the United States as a weed introduced from Europe, it was found in natural meadows in the high Sierra Nevada (Nos. 1403, 1670) in cold, wet soil, undoubtedly indigenous.

Arabis arcuata (Nutt.) in Torr. & Gr. Fl. i. 77 (1838), under *Streptanthus;* Gray, Proc. Amer. Acad. vi. 187 (1864). Type locality, "shelving rocks, on high hills near St. Barbara, Upper California."

Valley of Kaweah River (No. 1350), and in Willow Creek Cañon, Panamint Mountains (No. 2082). Determined by Sereno Watson. No. 2082 is a form in habit closely resembling *A. pulchra,* while its capsules resemble those of *A. holbœllii.*

Arabis glabra (L.) Sp. Pl. ii. 666 (1753), under *Turritis;* Weinm. Gart. Dorp. 18 (1810). Type locality European.

Valley of Kaweah River (No. 1345). Determined by Sereno Watson. This is the *A. perfoliata* of Lamarck.

Arabis hirsuta (L.) Sp. Pl. ii. 666 (1753), under *Turritis;* Scop. Fl. Carn. ed. 2. ii. 30 (1772). Type locality European.

Collected in the Sierra Nevada (Nos. 1450, 2118) and White Mountains (No. 1807). Determined by Sereno Watson. Dr. Watson notes No. 1450 as a "more glabrous and entire-leaved form."

Arabis lemmoni Wats. Proc. Amer. Acad. xxii. 467 (1887). Type locality, as taken from Mr. Lemmon's specimen, "California."

Farewell Gap, Sierra Nevada (No. 1747). Determined by Sereno Watson.

Arabis perennans Wats. Proc. Amer. Acad. xxii. 467 (1887). Type locality not given; range, "from northern Nevada and Utah to Arizona and the San Bernardino Mountains in California."

Surprise Cañon, Panamint Mountains (No. 611). Determined by Sereno Watson.

Arabis platysperma Gray, Proc. Amer. Acad. vi. 519 (1865). Type locality, "Sierra Nevada, on Mount Dana, alt. 13,227 feet, and above Ebbett's Pass."

In the high Sierra Nevada (Nos. 1492, 1515, 1547). Authenticated by Sereno Watson. These specimens agree with *A. platysperma* in all respects except that the leaves and stem are glaucous and glabrous, the ciliation of the former excepted. These plants have therefore varied toward *A. howellii* of Watson. Those that grew at timber line are much more stunted than specimens from a lower altitude.

Arabis pulchra Wats. Proc. Amer. Acad. xxii. 468 (1887)—Jones in herb. Type locality, "valleys of western Nevada, to San Bernardino and San Diego Counties, California."

This well-marked species was seen only in the Panamint Mountains, confined to the subpiñon belt of the Upper Sonoran, in Johnson Cañon (Nos. 509, 591), in Surprise Cañon (No. 635), and in Willow Creek Cañon (No. 778). The specimens were identified by Sereno Watson.

Arabis repanda Wats. Proc. Amer. Acad. xi. 122 (1876). Type locality, "Yosemite Valley."

Near Mineral King, Sierra Nevada (No. 1389). Determined by Sereno Watson.

Streptanthus cordatus Nutt. in Torr. & Gr. Fl. i. 77 (1838). Type locality, "forests of the Rocky Mountains."

Grapevine Mountains (No. 1765).

Streptanthus longirostris Wats. Bot. King Surv. 17 (1871), under *Arabis;* Wats. Proc. Amer. Acad. xxv. 127 (1890). Type localities, "at the Steamboat Springs near Washoe City, about Humboldt Lake, Nevada, and on Stansbury Island, in Salt Lake; 4,500 feet altitude."

Vegas Wash (No. 426). Determined by Sereno Watson.

Streptanthus tortuosus Kellogg, Proc. Cal. Acad. ii. 152 (1862). Type locality, "copper region of the Sierra Nevada Mountains."

In the Sierra Nevada (Nos. 1412, 1833).

Thelypodium cooperi Wats. Bot. Cal. ii. 431 (1880). Type locality, "on the Mohave River."

Collected in the Vegas Wash (No. 462), in Johnson Cañon (No. 505), and near Mill Creek Cañon (No. 799). The lower leaves of this plant in all our specimens are oblanceolate and sparingly repand-dentate. The petals are ochroleucous and exceed the sepals by only about 2.5 mm.

Thelypodium lasiophyllum (Hook. & Arn.) Bot. Beech. 321 (1839–40), under *Turritis;* Greene, Bull. Torr. Club, xiii. 142 (1885). Type locality Californian.

The plant was collected only in Johnson Cañon, Panamint Mountains (No. 510). This is the *Sisymbrium reflexum* of Nuttall.

Caulanthus crassicaulis (Torr.) in Stansb. Rep. 383 (1852), under *Streptanthus;* Wats. Bot. King Surv. 27 (1871). Type locality, "Mountain side, on the east shore of the Salt Lake, Utah."

The species was seen only on the northern edge of the Darwin Mesa near Mill Creek Cañon (No. 790), and in the vicinity of our camp on Willow Creek.

Caulanthus inflatus Wats. Proc. Amer. Acad. xvii. 364 (1882). Type locality, "in the Mohave Desert, California."

This plant was seen April 25, 1891, along the road between Searles Borax Works and Summit Station, at nearly the altitude of the latter place; and late in June on the Mohave Desert, between Mohave and Willow Spring. Dead stalks of either this species or *C. crassicaulis* were seen in the winter near the summit of the first divide, about 16 miles north of Daggett, on the road to Lone Willow Spring.

Caulanthus pilosus Wats. Bot. King Surv. 27 (1871). Type locality, "on dry foot-hills in the Truckee Valley, and near Humboldt Lake, Nevada."

Near Crystal Spring in the Coso Mountains (No. 925). In our specimens the sepals are of a deep purple and quite glabrous. The capsules are usually ascending, but in one very large plant they reach a length of 22 cm. and are 2.5 mm. thick, and are recurved on spreading pedicels.

Cardamine breweri Wats. Proc. Amer. Acad. x. 339 (1875). Type locality, as taken from Brewer's specimen, "near Sonora Pass [Sierra Nevada] at 8–10,000 feet altitude."

Near Mineral King, Sierra Nevada (No. 1430).

Lesquerella gordoni sessilis Wats. Proc. Amer. Acad. xxiii. 253 (1888). Type locality, "extreme western Texas to New Mexico and Arizona."

In the Vegas Wash (No. 406). Determined by Sereno Watson.

Lesquerella kingii Wats. Proc. Amer. Acad. xx. 353 (1885), under *Vesicaria;* Wats. Proc. Amer. Acad. xxiii. 251 (1888). Type locality, "West Humboldt Mountains, Nevada."

Telescope Peak, Panamint Mountains (No. 2025).

Physaria newberryi Gray in Torr. Bot. Ives Exped. 6 (1860). Type locality, "near Tegua (Moqui village)," Arizona.

Mountain Springs, Charleston Mountains (No. 1882). Determined by Sereno Watson.

Draba caroliniana micrantha (Nutt.) in Torr. & Gr. Fl. i. 109 (1838), as *D. micrantha;* Gray, Man. ed. 5. 72 (1867). Type locality, "open plains and rocky places about St. Louis, and in Arkansas."

The specimens of this plant collected in the Panamint Mountains (No. 638) are 5 cm. or less high, and resemble in all details specimens from Idaho and Washington.

Draba glacialis Adams, Mem. Soc. Mosc. v. 106 (1821).

Cottonwood Creek, White Mountains (No. 1809).

Draba lemmoni Wats. Bot. Cal. ii. 430 (1880). Type locality, "summit of Mount Lyall, at 13,000 feet altitude."

Collected in the Sierra Nevada (Nos. 1541, 2069). Determined by Sereno Watson. Dr. Watson refers our flowering specimens of No. 1541 doubtfully to this species, with the note, "it comes nearest apparently to real *D. alpina*, which has never been found in the United States. It does not show the *thick* leaves which are characteristic of *D. lemmoni*, but these may come with age, as also the twisted pods which serve to distinguish that species."

Draba sonoræ Greene, Bull. Cal. Acad. ii. 59 (1886). Type locality, "northwestern Sonora."

Our specimens, like others collected in the Colorado Desert, differ from the original in a few minor details. They are of about the same size but more robust, and have more spreading pedicels and larger capsules, approaching in general appearance *D. cuneifolia*. But the stellate pubescence of the capsule, pointed out by Dr. Watson[1] as principally characteristic of the species, is distinctly marked.

The species is characteristic of the Lower Sonoran zone, and was found in the Vegas Wash (No. 417), and in Johnson (No. 487) and Willow Creek cañons, Panamint Mountains.

Draba stenoloba Ledeb. Fl. Ross. i. 154 (1841). Type locality, "in ins[ula] Unalaschka."

Near Mineral King, Sierra Nevada (No. 1568). In ours, as in most Sierran specimens, all the leaves are entire.

Draba subsessilis Wats. Proc. Amer. Acad. xxiii. 255 (1888). Type locality, "o . the White Mountains of Mono County, California, at 13,000 feet altitude."

Near Mount Whitney (No. 2051). Determined by Sereno Watson.

Sisymbrium canescens Nutt. Gen. ii. 68 (1818). Type locality not given; range "from Virginia to Georgia."

Although the characters and geographical ranges of the various forms of *S. canescens* and *S. incisum* are not well determined, in this region there are two easily distinguishable plants, one very canescent, with finely divided leaves and without glandular hairs; the other larger with broader leaf lobes, viridescent, and usually with some glandular hairs. The former is here referred to as *S. canescens*. It occurs throughout the desert up to about the lower limit of trees. The other, *S. incisum*, is found in the forest regions nearly to timber-line.

Specimens were collected in Resting Springs Valley (No. 284) and in Johnson Cañon, Panamint Mountains (No. 512).

Sisymbrium diffusum Gray, Pl. Wright. i. 8 (1852). Type locality, "pass of the Limpia, in crevices of rocks on the mountains."

Authenticated by Sereno Watson. Main branches 40 to 65 cm. long. Lower leaves 5 to 10 cm. long. Sepals 3 to 3.8 mm. long, the petals about one half longer. Immature capsules 11 mm. long, on pedicels sometimes 7 mm. long. From these measurements it will be seen that our specimens are considerably more robust and the parts larger than specimens from Texas and New Mexico. The plant is, however, identical in all other characters and in habitat with those plants.

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[1] Proc. Amer. Acad. xxiii. 256 (1888).

It occurred in but one locality, a few miles east from Crystal Spring (No. 942), in a narrow part of the cañon leading from it; and only a few plants were seen. It has previously been collected only in Texas, New Mexico, and adjacent Mexico.

Sisymbrium incisum Engelm. in Gray, Pl. Fendl. 8 (1849). Type localities, "banks of streams in New Mexico; Santa Fe Creek, and Mora River."

Collected near Mineral King (No. 1477), about Whitney Meadows (No. 1613), and at Big Cottonwood Meadows (No. 2131), localities all in the Sierra Nevada.

Erysimum asperum (Nutt.) Gen. ii. 69 (1818), under *Cheiranthus;* DC. Syst. ii. 505 (1821). Type locality, "on the plains of the Missouri, commencing near the confluence of White river."

Frazier Mountain (No. 1201). Determined by Sereno Watson. This plant is an erect biennial, 50 to 70 cm. high, canescent with pick-shaped hairs, with narrowly linear-oblanceolate, entire, or laterally 1- or 2-dentate, leaves, and orange flowers.

Erysimum asperum perenne Wats. in Coville, Proc. Biol. Soc. Wash. vii. 70 (1892). Type locality as given below. PLATE III.

"Apparently perennial, the old stem-base horizontal or nearly so; stem erect, 25 to 50 cm. high; radical leaves oblong to oblanceolate, entire or very sparsely denticulate-dentate, tapering into a long petiole, sparsely strigose (like the stem) with the pick-shaped hairs of *E. asperum;* stem leaves narrowly oblanceolate; petals light yellow; fruit wanting.

"Type specimen in the United States National Herbarium, No. 1487, Death Valley Expedition; collected August 5, 1891, between Mineral King and Farewell Gap, Sierra Nevada, Tulare County, California, by Frederick V. Coville.

"Dr. Watson, in answer to my letter (forwarded to him with the specimens) saying that this plant appeared distinct from *E. asperum* and similar to *E. pumilum* of Nuttall, determined the plant questionably as a new variety of *E. asperum*, and sent the following note: 'This may be distinct, but it is impossible to define a new species from this material. It has not the habit of "*E. pumilum*," which is a very dubious species. Its perennial character, as your specimens show, is not always obvious, and our other high mountain specimens from California and elsewhere do not help to distinguish it from *E. asperum*.' The plant differs conspicuously from the ordinary Californian form of *E. asperum* in its yellow instead of orange petals, perennial rootstock, smaller size, less canescent herbage, and broader root-leaves, and, furthermore, in its geographic range at a uniformly higher altitude, above the belt of *Pinus jeffreyi*, to which, with that of *Pinus ponderosa*, the former appears to be confined."

Collected also in Big Cottonwood Meadows (No. 2132).

Stanleya elata Jones, Zoe, ii. 16 (1891). Type locality, "near Hawthorne," Nevada.

This plant is conspicuously different from *S. pinnata* in many respects, as Mr. Jones (*ibid.* 17) has pointed out. It was found in Willow Creek Cañon, Panamint Mountains, in a cañon of the Inyo Mountains, near Swansea, and in the main cañon on the road from Darwin to Keeler (No. 946).

Stanleya pinnata (Pursh) Fl. ii. 739 (1814), under *Cleome;* Britton, Trans. N. Y. Acad. viii. 62 (1889). Type locality, "in Upper Louisiana." Nuttall, who is the author of the genus *Stanleya*, and who named[1] this species *S. pinnatifida*, gives its range as follows: "Commencing, (as we observed,) near the confluence of Paint creek and the Missouri, growing on the talus of broken calcareous cliffs; from hence it occurs locally for 2[00] or 300 miles further up the river, so that it appears only to occupy a limited belt which traverses the Missouri."

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[1] Gen. ii. 71 (1818).

Specimens of No. 723, as well as those collected in California in general, have pinnatifid leaves, while entire leaves are often borne upon the same stem, and sometimes, as in a portion of No. 287, a plant bears entire leaves only. The suffrutescen. base of the stem sometimes attains a diameter of more than 2 cm.

The species was found in Paradise Valley; in the northern part of Resting Springs Valley (No. 287); near Winter's ranch, Pahrump Valley; near Devil Hole, Ash Meadows; at several points in Vegas Valley; in Surprise Cañon, Panamint Mountains (No. 723); between Keeler and Crystal Spring; between Lone Pine and Olancha; along Canebrake Creek, on the west slope of Walker Pass; in Tehachapi Cañon; and in Antelope Valley. Dr. Merriam has recorded it also in the northern part of Owens Valley and in Deep Spring Valley, California; and in Fish Lake Valley, Grapevine Cañon, Sarcobatus Flat, Oasis Valley, and Pahranagat Valley, Nevada.

Tropidocarpum gracile Hook. Ic. Pl. i. t. 43 (1837). Type locality, "Monterey, California."

Near San Bernardino (No. 36).

Brassica nigra (L.) Sp. Pl. ii. 668 (1753), under *Sinapis;* Koch in Rœhl. Deutschl. Fl. ed. 3. iv. 713 (1833.) Type locality European.

A mustard plant, probably of this species, was seen near a camping spot in the lower part of Surprise Cañon, Panamint Mountains.

Bursa divaricata (Nutt.) in Torr. & Gr. Fl. i. 117 (1838), under *Hymenolobus;* Kuntze, Rev. Gen. Pl. i. 21 (1891). Type locality, "shady grassy plains of the Oregon, near the junction of the Wahlamet."

In the Panamint and Coso Mountains (Nos. 816, 928). The leaves are almost always entire, rarely with a single tooth on one side.

Bursa pastoris (L.) Sp. Pl. ii. 647 (1753), as *Thlaspi bursa pastoris;* Wigg. Prim. Fl. Hols. 47 (1780). Type locality European.

A few specimens of this weed were seen at Summit Station, on the freight road between Mohave and Searles's borax establishment.

Lepidium flavum Torr. Pac. R. Rep. iv. 67 (1857). Type locality, "sandy places near the Mohave creek."

At Ash Meadows; in Vegas Valley, between Vegas Ranch and Corn Creek; and in Shepherd Cañon (No. 734).

Lepidium fremontii Wats. Bot. King Surv. 30 (1871). Type locality, "on the Mohave River."

This suffrutescent perennial occurred abundantly over a large part of the desert. It was recorded between Stoddard Wells and Daggett (No. 136); in the desert, just north of Daggett; in Paradise Valley; at the extreme southern end of Panamint Valley; at Lone Willow Spring, and on the mountain sides above; at various points in Resting Springs (No. 285) and Pahrump valleys; in the higher altitudes of the Funeral Mountains, west of Amargosa; between Furnace Creek and Ash Meadows; between the latter point and Pahrump; in Vegas Valley; in the Vegas Wash; on both slopes of the divide northwest of Towner's; in Johnson, Surprise (No. 612), and Willow Creek cañons, Panamint Mountains; at several points along the road from Hot Springs to Mohave; in a cañon near Swansea; between Keeler and Crystal Spring; near Lone Pine (No. 891); in Tehachapi Pass; and on the Mohave Desert between the last point mentioned and Willow Spring. The species is characteristic of the upper altitudes of the Lower Sonoran zone, seldom growing below 2,000 feet, and rarely, as at Lone Pine, growing above the *Larrea* belt.

Lepidium lasiocarpum Nutt. in Torr. & Gr. Fl. i. 115 (1838). Type locality, "near St. Barbara, Upper California."

In this species the general type of pubescence on the leaves, stems, pedicels, and capsules is from rough-puberulent to short-hispid, and in most cases these organs are entirely covered. In some specimens, however, the leaves and capsules are merely hispid-ciliate on the margins but smooth on their surfaces. Between these two extremes all gradations occur. No. 563 is an unusually large form growing in moist alluvial soil. The species is a common desert annual. Specimens were collected in the Vegas Wash (No. 407); in Johnson Cañon (Nos. 499, 520, 563), Surprise Cañon (No. 636), and Willow Creek Cañon (No. 773), Panamint Mountains; near Hot Springs, Panamint Valley (No. 690); and in the vicinity of Keeler (Nos. 849, 871, 878.)

Biscutella californica (Harv.) in Hook. Lond. Journ. Bot. iv. 77 (1845), under *Dithyræa;* Wats. Index, 51 (1878). Type locality, "in California."

Collected at the mouth of the Vegas Wash (No. 403), and near Keeler (No. 846). The plant was not seen at any other place.

Biscutella wislizeni (Engelm.) in Wisliz. Mem. 95 (1848), under *Dithyræa* [misspelled *Dithyrca*]; Wats. Index, 51 (1878). Type locality, "near Valverde and Fray Cristobal, north of the Jornada del Muerto," New Mexico.

Near St. George (No. 1962.)

Thysanocarpus curvipes Hook. Fl. Bor. Amer. i. 69 (1830). Type locality, "near the Great Falls of the Columbia."

Nos. 504, 1175, 1332. Determined by Sereno Watson. Nos. 1175 and 1332 are from the western side of the Sierra Nevada, and are of the ordinary type of the species, with conspicuously clasping stem-leaves, and the stems hirsute below. No. 1175 has pubescent capsules; No. 1332, smooth ones. No. 504, which was collected in Johnson Cañon, Panamint Mountains, in ultramontane California, differs from typical *T. curvipes* in having stem and leaves glabrous and glaucous throughout, and in the inconspicuously clasping character of the cauline leaves, each auricle of the latter not exceeding 1 mm. in breadth. There are included, under this number, plants with two distinct types of pods, one entirely glabrous, and the other densely puberulent with club-shaped hairs, those on the cell conspicuously larger, under a lens, than those on the wing. The plants were collected in the same cañon on different days and through a range of altitude of about 300 meters. They were not distinguished in the field, and all the specimens were put in together. In the National Herbarium are other specimens from the southern portion of the Great Basin, which, while showing an unimportant variation in the configuration of the wing of the capsule, coincide in character with our specimens—Nos. 567 and 568, Palmer, 1876, coinciding with our form having smooth capsules, and the Ives Expedition specimen with the other. No. 129 of the King Survey, although from the Great Basin, is not the same as our plant. The pubescence in the form with hairy capsule is different from that of *T. curvipes.* It is probable that the future student of this genus will find in these plants at least one species distinct from *T. curvipes.*

CAPPARIDACEÆ.

Cleome sparsifolia Wats. Bot. King Surv. 32 (1871). Type locality, "in Carson Desert, near Ragtown, Nevada."

Mr. Watson's type specimens were collected in August after all but the uppermost imperfectly developed leaves had dropped; so that one of the most conspicuous characters, the length of the petiole, was absent. These are in some of our specimens 4.7 cm. long. The leaflets are oblong-oblanceolate, obtuse, mucronate, minutely sessile-glandular on the margins, 1 cm. or less long, the petiolules 1 to 1.5 mm. long and of an orange-yellow color, strikingly different from the green of the petiole and leaflet. The anthers differ from those figured in the original drawing in being more or less sharply recurved. The plant is very abundant in the pure, not alkaline sand northeast of Keeler (No. 847), washed down on the mesa from Cerro Gordo Mountain, and it occupies large areas of this soil to the exclusion of nearly all other species. The larger specimens are often 50 cm. high.

Cleomella brevipes Wats. Proc. Amer. Acad. xvii. 365 (1882). Type locality, "at Camp Cady in the Mohave Desert, California."

None of the capsules in the type specimens have the horns developed, but are as originally described, "ovate 1.5 lines long." Some of the capsules in our specimens have this form, but others, evidently the normally well-developed ones, are rhomboidal or triangular (truncate at the base) in outline, and reach 4.5 mm. in breadth by 2.5 mm. in length. The plants grow abundantly in the strongly salt and alkaline soil in the meadows of *Distichlis spicata*, between the town of Keeler and the shore of Owens Lake (Nos. 853, 884).

This species has not been reported since the Parish Brothers found the type specimens.

Cleomella obtusifolia Torr. & Frem. in Frem. second Rep. 311 (1845). Type locality, "on the American fork of the Sacramento river."

The correctness of the locality given by Fremont for this plant has been for many years a doubtful one, and it has been supposed that he found it in the Mohave Desert region. The plant has been collected again, however, within the past few years, in the valley of the Sacramento, and this species may now be placed definitely in that group of plants, significant from the standpoint of geographic botany, which occur both in the great interior valley of California and in the deserts eastward from the Sierra Nevada. The species was met with by the expedition only about Keeler (No. 852) and on the west shore of Owens Lake, between Lone Pine and Olacha. It undoubtedly occurs in other parts of the desert traversed by the expedition, but was not in condition for identification at the time.

Cleomella parviflora Gray, Proc. Amer. Acad. vi. 520 (1865). Type locality, "Nevada, near Carson City."

Our specimens reach a height of 32 cm., and the stems and branches, although weak and flexuous, are nearly erect. The leaflets are sometimes 3 cm. long, usually obtuse and mucronate, but sometimes broadly acute. The plants grew in the moist, slightly alkaline, natural meadow directly in front of the ranch house at Haway Meadows (No. 1003).

Isomeris arborea Nutt. in Torr. & Gr. Fl. i. 124 (1838). Type locality, "St. Diego, California."

The backs of the leaves, especially when young, are more roughly short-pubescent than in any specimens seen from the west side of the Sierras. The plant was not in all cases distinguished in the field from *I. arborea globosa*, so that some of the few localities recorded may belong to that variety. The shrub was first seen between the summit and middle stations on the road from Mohave to Searles's, and afterward in Tehachapi Cañon (No. 1132), near Gorman Station, and at the mouth of the Cañada de las Uvas. The two desert stations are in the upper part of the *Larrea* belt, the last two in the belt of *Quercus douglasii*.

Isomeris arborea globosa Coville, Proc. Biol. Soc. Wash. vii. 73 (1892). Type locality as given below. PLATE IV.

"Stem not glaucous; petals ovate, sub-palmately veined; capsule globose, truncate or retuse, 2.5 to 3.5 cm. long; seed with a transverse groove between hilum and body; otherwise as the type form.

"Our plant differs conspicuously from the type form in the shape of its capsules, a character at once noticeable in the living plant. The stems of the new year's growth in the t[illegible] glaucous; the petals narrowly oblong and pinnately veined;

Lepidium lasiocarpum Nutt. in Torr. & Gr. Fl. i. 115 (1838). Type locality, "near St. Barbara, Upper California."

In this species the general type of pubescence on the leaves, stems, pedicels, and capsules is from rough-puberulent to short-hispid, and in most cases these organs are entirely covered. In some specimens, however, the leaves and capsules are merely hispid-ciliate on the margins but smooth on their surfaces. Between these two extremes all gradations occur. No. 563 is an unusually large form growing in moist alluvial soil. The species is a common desert annual. Specimens were collected in the Vegas Wash (No. 407); in Johnson Cañon (Nos. 499, 520, 563), Surprise Cañon (No. 636), and Willow Creek Cañon (No. 773), Panamint Mountains; near Hot Springs, Panamint Valley (No. 690); and in the vicinity of Keeler (Nos. 849, 871, 878.)

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Isomeris arborea Nutt. in Torr. & Gr. Fl. i. 124 (1838). Type locality, "St. Diego, California."

The backs of the leaves, especially when young, are more roughly short-pubescent than in any specimens seen from the west side of the Sierras. The plant was not in all cases distinguished in the field from *I. arborea globosa,* so that some of the few localities recorded may belong to that variety. The shrub was first seen between the summit and middle stations on the road from Mohave to Searles's, and afterward in Tehachapi Cañon (No. 1132), near Gorman Station, and at the mouth of the Cañada de las Uvas. The two desert stations are in the upper part of the *Larrea* belt, the last two in the belt of *Quercus douglasii.*

Isomeris arborea globosa Coville, Proc. Biol. Soc. Wash. vii. 73 (1892). Type locality as given below.

PLATE IV.

"Stem not glaucous; petals ovate, sub-palmately veined; capsule globose, truncate or retuse, 2.5 to 3.5 cm. long; seed with a transverse groove between hilum and body; otherwise as the type form.

"Our plant differs conspicuously from the type form in the shape of its capsules, a character at once noticeable in the living plant. The stems of the new year's growth in the type form are glaucous; the petals narrowly oblong and pinnately veined;

the capsules oblong, attenuate into the stipe, abruptly tapering at the apex; and the seeds without a groove between the hilum and the body. The same plant as ours, but without mature fruit, was collected by Xantus de Vesey near Fort Tejon in 1857-58.

"Type specimen in the United States National Herbarium, No. 1107, Death Valley Expedition; collected June 24, 1891, on Caliente Creek, a few miles above Caliente, Kern County, California, by Frederick V. Coville.

"The characteristic distribution of this variety was not ascertained. It might be expected to be a form modified by proximity to the Mohave Desert, but the type form enters the western portion of this desert in at least one place, Tehachapi Pass; and flowering specimens, presumably of the type form, were seen in April about forty miles from Mohave, on the road from that place to Searles's borax establishment."

Oxystylis lutea Torr. & Frem. in Frem. Second Rep. 313 (1845). Type locality, "on the Margoza river, at the foot of a sandy hill; only seen in one place, but abundant there."

Collected in Furnace Creek Cañon (No. 223), in the bed of the Amargosa River, about 10 kilometers south of Salt Wells; in the sandy mesa immediately northwest of Saratoga Springs; and about the sand-hills 3 kilometers northeastward from the same point.

The plant is an annual, with a stout, erect, usually unbranched stem often reaching a height of 1 meter. The valves of the capsules, each with its embraced seed, had already dropped off when the specimens were collected, in January. The leaves also were dried and broken off by the wind, yet the remaining skeleton of the plant, the naked stem, and the old fruit clusters, rendered it conspicuous. In the latter three of the localities mentioned above, all in the valley of the Amargosa River, both above and below its bend at Saratoga Springs, the plants are abundant. It was at or near the last station that Fremont, on the 28th of April, 1844, discovered this plant; and it has never been collected since. He records the finding of it as follows (loc. cit. 264): "[We] reached a large creek of salt and bitter water, running in a westerly direction, to receive the stream bed we had left. It is called by Spaniards *Amargosa*—the bitter water of the desert. Where we struck it, the stream bends; and we continued in a northerly course up the ravine of its valley, passing on the way a fork from the right, near which occurred a bed of plants, consisting of a remarkable new genus of Cruciferæ."

It is unfortunate that at the second collecting of such an interesting monotypic genus the specimens should have been poor ones.

RESEDACEÆ.

Dipetalia subulata (Webb & Berth.) Phytogr. Canar. i. 107 (1836-40), under *Resedella*;[1] Kuntze, Rev. Gen. Pl. i. 39 (1891). Type locality, "circa Portum Caprarum in insula Fuerteventura, et in Lancerotta circa oppidum Arecife."

Found at Resting Springs; on the foot-slopes of the Funeral Mountains, west of Amargosa; in the Vegas Wash; in Furnace Creek Cañon (No. 583); north of Bennett Wells; and along the stream from Hall Cañon, Panamint Mountains (No. 679).

CISTACEÆ.

Helianthemum scoparium Nutt. in Torr. & Gr. Fl. i. 152 (1838). Type locality, "dry hills around Monterey, California."

Near San Bernardino (No. 16).

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[1] The first mention of the plant, Delile, Fl. Ægypt. Ill. 15 (1813), is the printing of the name *Reseda subulata* without description.

VIOLACEÆ.

Viola blanda Willd. Hort. Berol. t. 24 (1816). Type locality, "in America boreali."

Near Pine City, Sierra Nevada (No. 1831).

Viola canina adunca (Smith) in Rees, Cycl. xxxvii (1819), as *V. adunca;* Gray, Proc. Amer. Acad. viii. 377 (1873). Type locality, "west coast of North America." Collected by Menzies.

In the Sierra Nevada (Nos. 1859, 2115), the latter determined by H. E. Seaton.

Viola glabella Nutt. in Torr. & Gr. Fl. i. 142 (1838). Type locality, "shady woods of the Oregon."

Valley of Kaweah River (No. 1372).

Viola præmorsa, Lindl. Bot. Reg. xiv. t. 1254 (1829)—Dougl. in herb. Type locality, "in dry upland soils, under the shade of solitary pine-trees, on the banks of the Columbia, and the plains of the river Aguilar, in California."

In the Panamint Mountains (No. 751), and in the southern Sierra Nevada (No. 1087). Dr. Kellogg's *Viola aurea* is antedated, according to Dr. Gray,[1] by Douglas's *V. præmorsa.* Our plant is a canescent-puberulent form, with leaves more deeply dentate than usual, and the two upper petals purple on the back. Altogether our plant resembles in general appearance Professor Greene's *V. pinetorum.*[2]

POLYGALACEÆ.

Krameria canescens Gray, Pl. Wright. i. 42 (1852). Type locality, "prairies near the Pecos," Texas.

This species was found by Dr. Merriam and Mr. Bailey in the valleys of the Virgin (No. 1926) and Muddy rivers, Nevada.

Krameria parvifolia Benth. Bot. Sulph. 6 (1844). Type locality, "Bay of Magdalena," Lower California.

The first specimens of *Krameria* were observed at Copper City Spring, about 60 kilometers north of Daggett. It was next seen on the divide between Saratoga Springs and Amargosa, where it occurred in abundance. It was found afterwards on the mountain east of Resting Springs; about Twelve Mile Spring, Resting Springs Valley; on both slopes of the divide between this and Pahrump valleys; on the divide between Ash Meadows and Pahrump; on the rocks about the Devil Hole, Ash Meadows; on the western foot-slopes of the Charleston Mountains, along the roads to both Clark's sawmill and Mountain Spring Pass; at several points in Vegas Valley; on both slopes of the divide northwest of Towner's; on the eastern foot-slopes of the Funeral Mountains, west of Amargosa; and in the upper part of Johnson Cañon, Panamint Mountains. Mr. Bailey collected flowering specimens in Resting Springs Valley (No. 1874). A few of the localities here recorded may prove to be those of *K. canescens*, as most of the observations were made in winter, and the plants did not always show their specific characters. It was only in limestone soil that *Krameria parvifolia* was abundant. Dr. Merriam reported it in Indian Spring, Pahranagat, Virgin, and Muddy valleys, Nevada; and in the Santa Clara Valley and Beaverdam Mountains, Utah.

FRANKENIACEÆ.

Frankenia grandifolia Cham. & Schlecht. Linnæa, i. 35 (1826). Type locality, "in sabulosis Novae Californiae ad portum St. Francisci."

In the Tulare Plains (Nos. 1127, 1231). The typical plant which grows within reach of the water of the Pacific Ocean is much broader-leafed than the plant of the interior saline plains, those of the former being usually obovate, of the latter linear to oblong-oblanceolate. Our specimens belong to the interior form, and their stems, as well as those of all similar specimens in the National Herbarium, are erect, never creeping, as is often or perhaps commonly true of the coast form.

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[1] Bot. Gaz. xi. 289 (1886).

[2] Pittonia, ii. 14 (1889).

CARYOPHYLLACEÆ.

Silene californica Durand, Pl. Pratt. 83 (1855). Type locality, "hills of Deer Creek," California.

In the southern Sierra Nevada (No. 1094).

Silene bernardina Wats. Proc. Amer. Acad. xxiv. 82 (1889). Type locality, "on shady slopes in Long Meadow, Tulare Co., California."

Near Whitney Meadows, Sierra Nevada (No. 1649). This has been previously collected only by Dr. Edward Palmer, in 1888, from whose specimens the species was described. The stems grow many together, from nearly erect slender rootstocks arising from a thick vertical root. The dense leaves are usually not more than 1 mm. broad and never, either in the type or in our specimens, broader than 2 mm.

Silene luisana Wats. Proc. Amer. Acad. xxiii. 261 (1888). Type locality, "on rocks near San Luis Obispo," California.

Tejon Mountains (No. 1185). Determined by Sereno Watson. Dr. Watson writes me, "I take your Silene to be *S. Luisana*. * * * It is a better specimen than any I have; the leaves broader, less glandular below, and peduncles somewhat longer; but it is otherwise the same thing, and it is from near the same region."

Lychnis californica Wats. Proc. Amer. Acad. xii. 248 (1877). Type localities, "in the high Sierra Nevada; near Ebbett's Pass, on Mount Dana, and in Sierra or Plumas County," California.

Near Mineral King, Sierra Nevada (No. 1532).

Alsine baicalensis.

Stellaria umbellata Turcz. Fl. Baic. i. 236 (1842–45). The use of the name *Alsine umbellata* for this species is prevented by the employment of that binomial by Lamarck, in 1778, for *Holosteum umbellatum*.

Near Mineral King, Sierra Nevada (No. 1570), and in the White Mountains (No. 1805).

Alsine longipes (Goldie) Edinb. Phil. Jour. vi. 327 (1822), under *Stellaria*. Type locality, "woods near Lake Ontario," on the Canadian side.

In the Sierra Nevada (Nos. 1435, 1674), and the White Mountains (No. 1805).

Alsine media L. Sp. Pl. i. 272 (1753). Type locality European.

Near Three Rivers (No. 1291).

Arenaria compacta Coville, Proc. Biol. Soc. Wash. vii. 67 (1892). Type locality as given below. PLATE V.

"Stems compacted into a dense mat from a thick, woody, many-branched caudex, the densely leafy lower portion 1 cm. or less high; flowering stems scantily leafy, sparingly cymosely branched, 5 cm. or less high, clothed with short glandular hairs; leaves awl-shaped, triangular in cross-section, pungent, glandular-ciliate, 5 mm. or less long, squarrose; those of the flowering stems similar, usually glandular-hairy on the back, erect, passing into scarious bracts above; flowers single, terminating simple stems, or in open few-flowered cymes; sepals 5, 2.5 to 3.5 mm. long, ovate to ovate-lanceolate, scarious-margined, with a thick green midrib excurrent into a point; petals 5 or 6, oblong-oblanceolate, broadly obtuse; stamens 10 to 12; styles 3 or 4.

"Type specimen in the United States National Herbarium, No. 1653, Death Valley Expedition; collected August 20, 1891, at timber-line on a divide northwest of Whitney Meadows, Sierra Nevada, Tulare County, California, by Frederick V. Coville.

"The plant is of especial interest because it is evidently a local alpine species derived not from the circumpolar *Arenaria biflora* and *A. arctica*, but from some local species of a lower zone, similar to *A. fendleri*. Its sepals distinguish it at once from the circumpolar plants mentioned above, in which these organs are thin, striate, and obtuse. In habit, however, it closely resembles them, having attained the depressed, matted, shrubby form so protective to plants at high altitudes."

Mr. Koch collected specimens at timber-line in the vicinity of Dutcher's camp, Big Cottonwood Meadows, not more than 15 kilometers from the type locality (No. 2119.)

Arenaria congesta Nutt. in Torr. & Gr. Fl. i. 178 (1838). Type locality, "shady hills in Rocky Mountain range, about Bear River of the Lake of Timpanagos."

Near Mineral King, Sierra Nevada (No. 1504). In our specimens the stems are viscid-glandular in their middle portions, but above and below they are glabrous. The pedicels of the umbelloid inflorescence are about 5 mm. long.

Arenaria congesta subcongesta Wats. Bot. King Surv. 40 (1871), as *A. fendleri subcongesta;* Wats. Bot. Cal. i. 69 (1876). Type locality, "East Humboldt Mountains, Nevada; 7–9,000 feet altitude."

Grapevine Mountains (No. 1764). Our plant is 10 to 20 cm. high and has leaves 1 to 2 cm. long, glandular-viscid stems, small but not congested cymes, and sepals glabrous, acute, scarious-margined, and with a narrow, green, 1- to 3-nerved midrib. It is evidently the plant called *A. capillaris* in Flora Franciscana and a portion of that called by the same name in the Botany of California. I have designated it by the name used above because, although not glabrous, the plant is often referred to that variety, and the original description might be stretched to include it. *A. capillaris* of Poiret[1] is, according to the description, a tall plant glabrous throughout, with the lower leaves 2 inches long, and with *obtuse* sepals. Its type locality is Siberia. *A. nardifolia* of Hooker[2], which has been referred by Regel to *A. capillaris* as a variety, shows both in specimens from British Columbia and from Oregon, as well as in Hooker's description and figure, that the plant is easily distinguished from *A. congesta*, *A. fendleri*, *A. macradenia*, etc., in its broad, very obtuse, scarcely scarious-margined sepals. Those species have sharply acute sepals. The plant called *A. formosa* in the Botany of the King Survey, which was referred to *A. capillaris* in the Botany of California, in external appearance exactly resembles *A. macradenia*, and has not the obtuse sepals of *A. capillaris* and its variety *nardifolia*. The glandular protuberances at the base of the stamens are not clear, however. It appears, therefore, that *A. capillaris* is represented in North America only by its variety *nardifolia*, a northwestern plant extending as far south as Oregon, and that the more southern plants with acute sepals, commonly referred to *A. capillaris* belong to *A. macradenia* and to *A. congesta subcongesta* as the latter is now understood.

Arenaria macradenia Wats. Proc. Amer. Acad. xvii. 367 (1882). Type locality, "near the Mohave River, and in the mountains bordering the Mohave Desert," California.

In duplicates of the type specimen of this species (Palmer, No. 41, 1876), there is in the filaments opposite the sepals, on each side of the base, a gland or blunt tooth, and in the other number referred to the species by Dr. Watson (Parish Brothers, No. 1329, 1882), these glands, although present, are very rudimentary. In our No. 830 the glands are developed into lacerate scales reaching a length of 2 mm., and inserted on the margin and the back of the base of the filament. The capsule equals or exceeds the calyx. The species may be distinguished from *A. fendleri* by its broad, oblong-ovate, smooth, green, scarious-margined sepals striate when dry. In *A. fendleri* the sepals are lanceolate, and the green portion is confined to a narrow, glandular-pubescent, usually keeled midrib.

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[1] Cycl. vi. 380 (1804).

[2] Fl. Bor. Amer. i. 98 (1830).

This species occurred in the clefts of naked rocks, on steep slopes, and in cañons, near the upper spring at Lone Willow Spring (No. 162); near Mesquite Spring, in the Funeral Mountains (No. 329); in Surprise Cañon and Willow Creek Cañon (No. 830), Panamint Mountains; and at Crystal Spring, Coso Mountains (No. 916).

Lœflingia squarrosa Nutt. in Torr. & Gr. Fl. i. 174 (1838). Type locality, "sandy plains, St. Diego, California."

Walker Basin (No. 1091).

PORTULACACEÆ.

Oreobroma nevadensis (Gray) Proc. Amer. Acad. viii. 623 (1873), under *Calandrinia;* Howell, Erythea, i. 33 (1893). Type localities, "subalpine region of Wahsatch and East Humboldt Mountains [Nevada]," and "Sierra Nevada, California, at Summit and Cisco."

Near Mineral King, Sierra Nevada (No. 1518).

Oreobroma pygmæa (Gray) Amer. Journ. Sci. ser. 2. xxxiii. 407 (1862), under *Talinum;* Howell, Erythea, i. 33 (1893). Type locality, "Bridger's Pass."

In the Sierra Nevada (Nos. 1666, 2068), and the White Mountains (No. 1799). Nos. 1666 and 2068 differ from the other specimens, which belong to the typical form of the species, in their more evenly glandular-serrate, purple-margined sepals and their longer style, as well as in the white, not orange, color of the surface of the root.

Claytonia chamissoi Ledeb. in Spreng. Syst. Veg. i. 790 (1825). Type locality, "Ins[ula] Aleut[ica]."

In the high Sierra Nevada (Nos. 1582, 1618, 2122). The plant was always found growing on nearly clean, fine gravel, over which a thin stream of almost ice-cold spring water was flowing. On the surface of the gravel and underneath the matted stems of the plant are produced, at the ends of slender flagellae, an abundance of white or pink tubers about as big as peas. In trying to disentangle single specimens of the plant, the collector almost invariably breaks off these tubers.

Claytonia perfoliata Donn in Willd. Sp. Pl. i. 1186 (1798). Type locality, "in America boreali."

The plant was recorded from the Panamint Mountains, in Johnson (No. 561), Surprise (No. 608), Willow Creek, and Mill cañons; and from the Sierra Nevada, in the valley of the Kaweah River (No. 1370). In these localities it grew at the shaded bases of cliffs and among rocks, near the lower limit of coniferous vegetation. The plant makes an excellent pot-herb, and in the Panamint Mountains was frequently used as such by the expedition. No. 561 has linear to oblanceolate root-leaves and glomerate inflorescence, varying toward *C. spathulata* Dougl. Its connate-perfoliate cauline leaves and its large seeds, together with the place of its growth, lead me to consider it an erratic form of *C. perfoliata.*

Claytonia triphylla Wats. Proc. Amer. Acad. x. 345 (1875). Type locality, "above Cisco, California."

Near Mineral King, Sierra Nevada (No. 1517).

Montia fontana L. Sp. Pl. i. 87 (1753). Type locality European.

Whitney Meadows, Sierra Nevada (No. 1619).

Spraguea umbellata Torr. Pl. Frem. 4 (1853). Type locality, "forks of the Nozah River, in the foot-hills of the Sierra Nevada of Northern California." The po[illegible]h River is a branch of the Sacramento, west of Lassen Peak.[1]

3 or 4. Sierra Nevada (Nos. 1448, 1827, 2070, 2091, 2135). The separation of this

"Type s

Expedition;

ney Meadows,

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[1] Fremont, Memoirs, p. 651 (1887).

genus from *Calyptridium*, as noted in the recent observations of Watson,[1] Greene,[2] and Gray,[3] rests on a very scant basis.

Calyptridium monandrum Nutt. in Torr. & Gr. Fl. i. 198 (1838). Type locality, "St. Diego, California."

Near Havilah (No. 1083).

Calyptridium roseum Wats. Bot. King Surv. 44 (1871). Type locality, "in the Truckee and Monitor Valleys," Nevada.

Telescope Peak (No. 2029). The specimens are only fragmentary, but the plant appears to belong here.

Lewisia rediviva Pursh, Fl. ii. 368 (1814). Type locality, "on the banks of Clarck's river."

In the Inyo Mountains (No. 1779), and near Shoal Creek, Utah (No. 1967).

HYPERICACEÆ.

Hypericum anagalloides Cham. & Schlecht. Linnæa, iii. 127 (1828). Type locality, "Ad portum St. Francisci, Californiae, obviam nobis venit."

In the Sierra Nevada (Nos. 1036, 1290). These specimens, like others collected by J. G. Lemmon in the Sierra Nevada, are densely matted from a rootstock of apparently the preceding year, and have smaller, more simply veined leaves and smaller flowers and fruit than are usual in the species.

Hypericum formosum scouleri (Hook.) Fl. Bor. Amer. i. 111 (1830), as *H. scouleri;* Coult. Bot. Gaz. xi. 108 (1886). Type locality, "on the North-West coast of America, near the Columbia."

On the western slope of the Sierra Nevada (Nos. 1595, 1847).

MALVACEÆ.

Malva parviflora L. Amœn. Acad. iii. 416 (1756). Type locality not given; species described from specimens cultivated at Upsala.

This plant was found at Furnace Creek Ranch, Death Valley (No. 472), and at a camping ground in Surprise Cañon, growing in both places as a weed.

Sidalcea malvæflora (DC.) Prodr. i. 474 (1824), under *Sida;* Gray, Pl. Wright. i. 16 (1852). Type locality, "in Mexico."

Near Lone Pine (No. 954), and at Haway Meadows (No. 1004). In our specimens the stems are very scantily or not at all hirsute below, and glaucous, the calyx tomentose with short-branched hairs, but not hirsute, and the mature carpels reticulated on the back. In the pubescence of the calyx the plant is quite different from the *S. malvæflora* of Arizona and New Mexico, which is hirsute and without tomentum.

Sidalcea spicata (Regel) Gartenfl. xxi. 291 (1872), under *Callirhoe;* Greene, Bull. Cal. Acad. i. 76 (1885). Type locality, "in der Sierra Nevada Californiens." The descriptions were drawn from plants cultivated in Europe, the seeds collected by Roezl in the place cited. Professor Greene's plant was from "Cisco, Sierra Nevada, Cal."

In the Sierra Nevada (Nos. 1462, 2103).

Malveopsis fremontii (Gray) Pl. Fendl. 21 (1849), under *Malvastrum*—Torr. MS.; Greene, Erythea, i. 171 (1893). Type locality, "interior of California."

Valley of the Kaweah River (No. 1310). Fremont probably collected the type specimens on the western slope of the Sierra Nevada, along the American Fork of the Sacramento River.

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[1] Proc. Amer. Acad. xx. 356 (1885).

[2] Bull. Torr. Club, xiii. 144 (1886).

[3] Proc. Amer. Acad. xxii. 284 (1887).

Malveopsis rotundifolia (Gray) Proc. Amer. Acad. vii. 333 (1868), under *Malvastrum;* Kuntze, Rev. Gen. Pl. i. 72 (1891). Type locality, "sand hills at Fort Mohave," Arizona.

This was observed on the mesa west of Bennett Wells (No. 481), and at the foot of the Funeral Mountains, opposite the same place; in the dry wash of the Amargosa, between Salt Wells and Saratoga Springs; in Resting Springs Valley; on the western slope of the divide northwest of Towner's; in Furnace Creek Cañon (No. 452); in Panamint Valley, at the mouth of Hall Cañon; in Surprise Cañon, Panamint Mountains; and near Swansea. The plant is an annual of frequent occurrence on gravelly mesas and in washes, always growing in the Lower Sonoran zone. Its flowers are very striking, the globular pink corolla, with a red spot at the base of each petal, having given it the local name of "lantern flower."

Sida hederacea (Hook.) Fl. Bor. Amer. i. 107 (1830), under *Malva*—Dougl. MS.; Torr. in Gray, Pl. Fendl. 23 (1849). Type locality, "in the interior districts of the Columbia," probably in Oregon.

Near Lone Pine (No. 951).

Sphæralcea munroana (Lindl.) Bot. Reg. xvi. t. 1306 (1830), under *Malva*—Dougl. MS.; Spach. Hist. Veg. iii. 353 (1834). Type locality, "upon the barren plains of the Columbia."

The plants referred here are not, in most cases, in condition for critical determination. They all have the characteristic leaves of the species, and their petals, when fresh, were scarlet. Specimens of No. 868 alone bore mature fruit. The identity of all the plants supposed to belong to this species is so uncertain that a detailed statement of localities would be of little value. Specimens were collected on the south slope of Browns Peak (No. 176); near Furnace Creek Ranch (No. 352); in Johnson (No. 550) and Surprise (No. 634) cañons, Panamint Mountains; and at the western foot of the Inyo Mountains, near Swansea (No. 868).

CHEIRANTHODENDRACEÆ.

Fremontodendron californicum (Torr.) Pl. Frem. 6 (1853), under *Fremontia.* Type locality, "sources of the Sacramento, in the northern part of the Sierra Nevada of California."

The generic name *Fremontia* was first applied[1] by Torrey to the plant now known as *Sarcobatus vermiculatus*, but the name *Sarcobatus* had already been given to the genus by Nees von Esenbeck, and *Fremontia* became a synonym. Baillon has referred[2] the later *Fremontia*, our plant, to a Mexican genus *Cheiranthodendron*, an older name for *Cheirostemon* H. B. K., but Dr. Torrey, when he published the genus as *Fremontia*, knew the genus *Cheirostemon* also and pointed out some of the differences. Dr. Gray in one of his later papers,[3] after a mature consideration of the verified characters of the two genera, considered them distinct. He retained, however, the now untenable name *Fremontia*, in place of which I propose the name *Fremontodendron*.

On the summit of Walker Pass, as we came over from the desert, we first saw this beautiful tree (No. 1021). It was then in full bloom, and its masses of yellow flowers were conspicuous among the nut pines and gray-leaf pines of the western Sierran slope. We passed into its belt again when we crossed the divide north of Havilah, a third time on the divide north of Walker Basin, and a fourth time on the slope of the Sierra Nevada west of Tehachapi Valley. On some of the peaks south of Fort Tejon, below the yellow pine belt, it was abundant. When we ascended the western slope of the Sierra Nevada from Three Rivers, we encountered the tree first below Kane Flat, from which point it extended up to the yellow pines near Big Tree Cañon.

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[1] Frem. First Rep. 95 (1843).

[2] Baillon, Hist. Pl. iv. 70 (1873).

[3] Proc. Amer. Acad. xxii. 304 (1887).

Fremontodendron is one of the characteristic plants of the chaparral belt, in the higher and more densely wooded parts of that belt growing as a shrub 1.5 to 2 meters high; in the lower parts, when isolated, often attaining the dimensions of a small tree.

LINACEÆ.

Linum lewisii Pursh, Fl. i. 210 (1814). Type locality, "in the valleys of the Rocky-mountains and on the banks of the Missouri."

Specimens were collected by Mr. Funston near the head of Waucoba Cañon, Inyo Mountains (No. 1788.) The plant was also abundant about our camp in the Sierra Nevada, between Mineral King and Farewell Gap.

Linum micranthum Gray, Proc. Amer. Acad. vii. 333 (1868). Type locality, "on Mount Bullion, Mariposa Co.," California.

Between Kernville and Havilah (No. 1048). This species was described by Gray as "petalis albis basi utrinque subunidentatis," but by Trelease[1] as with petals "not toothed." The basal teeth that occur in the related species are really represented in this one only by an undulation on either side of the base of the petal. In our specimens all the flowers examined are without the median appendage of the petals.

ZYGOPHYLLACEÆ.

Larrea tridentata (DC.) Prodr. i. 706 (1824), under *Zygophyllum*. Type locality, "in regno Mexicano."

The plant was first described under its present genus by Moricand, Pl. Nouv. Amer. 71 (1833–46), as *Larrea mexicana*, under which name it has since passed. Fremont, in the narrative of his report of the exploring expedition made in the years 1842–1844, published in 1845, in describing his entrance into the Mohave Desert through Tehachapi Pass, says: "Several new plants appeared, among which was a zygophyllaceous shrub (*Zygophyllum Californicum*, Torr. & Frem.) sometimes 10 feet in height; in form, and in the pliancy of its branches, it is rather a graceful plant. Its leaves are small, covered with a resinous substance; and, particularly when bruised and crushed, exhale a singular, but very agreeable and refreshing odor." This description was not, however, included in the botanical report appended under the authorship of Torrey and Fremont, undoubtedly from the facts stated by Torrey in an introductory note, that the part of Fremont's collection which escaped destruction was so badly damaged that only a few of the most important species were published. Fremont's description quoted above, however, designates the plant definitely, and the name stands as a synonym. De Candolle's specific name refers to the tridentate (but obscurely so) character of the petals and stamen-scales.

The original description of *Zygophyllum tridentatum* (see reference above) says "foliolis obovatis villosis," a fact which, taken with the type locality, suggested that De Candolle's plant was not the same as that which occurs in the United States, although quoted as identical by Gray, Watson, and Hemsley. In our specimens the leaflets are usually lanceolate-falcate, or at their widest obliquely oblong, and are nearly glabrous, but an examination of other specimens showed the hairiness to be very variable, while one specimen from the State of Tamaulipas, Mexico, has obliquely obovate leaves agreeing with De Candolle's description. In 1848 Engelmann published the United States plant as *Larrea glutinosa*, in Wislizenus's Memoir of a Tour to Northern Mexico. Through the kindness of Dr. Casimir de Candolle I have been able to examine a tracing of the original plate upon which the description was founded. There can be no doubt that it is the common Mexican form of our well-known creosote bush.

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[1] Trans. St. Louis Acad. v. 19 (1887).

The dead branches of *Larrea* remain for many years without decomposing, and, although seldom more than 2 or 3 cm. in diameter, furnished the principal fuel used in the desert by the expedition.

Larrea tridentata is the most important zonal plant of the Lower Sonoran zone, growing with great uniformity over nearly the whole area of the desert region. We crossed its western limits at Hesperia, on the northern slope of the San Bernardino Mountains; at the altitude of 975 meters in Antelope Valley, about 8 kilometers west of Willow Spring; at the mouth of Tehachapi Cañon; and on the eastern slope of Walker Pass, at 1,160 meters. North of Walker Pass it finds its western limit at the eastern base of the Sierra Nevada as far as Owens Lake. North of that point the altitude of the region is too great and the plant does not occur, the line marking its northern limit turning eastward across the desert. Dr. Merriam has traced this line across California and Nevada to the southwestern part of Utah.

The upper limits of *Larrea* in some of the desert mountains have been worked out as follows: on Browns Peak, 1,325 and 1,370 meters; on Lone Willow Peak, 1,430 meters; west of Amargosa, on the north slope of a peak in the Funeral Mountains, 1,340 meters; on the western side of the Charleston Mountains, at 1,525 meters on a west slope and 1,415 meters on a north slope; on the eastern slope of the same range, at 1,370 meters; in the Panamint Mountains, near Johnson Cañon, at 1,700 meters; in Surprise Cañon, at 1,575 meters; in Mill Creek Cañon, at 1,400 meters. Specimens were collected near Hesperia (No. 50); near Daggett (No. 158); and at Furnace Creek Ranch, Death Valley (No. 467).

A more detailed account of the distribution of this shrub is given by Dr. Merriam in the general report. He found it along its northern limit in Oasis Valley, Grapevine Cañon, Indian Spring Valley, Pahranagat Valley, Virgin Valley, and valley of the lower Muddy, in Nevada; and the Santa Clara Valley, in Utah.

GERANIACEÆ.

Geranium richardsonii Fisch. & Traut. Ind. Sem. Petrop. iv. 37 (1837). Type locality,[1] "vallies in the Rocky Mountains."

In the Sierra Nevada (Nos. 1378, 1834, 2102). Professor Greene[2] has pointed out that this species, in California, grows at higher altitudes than *G. incisum* and in moister soil.

Erodium cicutarium (L.) Sp. Pl. ii. 680 (1753), under *Geranium;* Ait. Hort. Kew. ii. 414 (1789). Type locality European.

Erodium moschatum, the commoner species in the coast region of California, was not seen east of the Sierra Nevada, and probably does not occur in the deserts of the Great Basin. *E. cicutarium* was found to be of frequent occurrence in the desert, along the routes traveled by wagons. It seldom, however, grew large enough to be valuable for forage. Specimens were collected at San Bernardino (No. 34), near Hesperia (No. 49), and in Johnson Cañon, Panamint Mountains (No. 514).

RUTACEÆ.

Thamnosma montana Torr. & Frem. in Frem. Second Rep. 313 (1845). Type locality, "in the passes of the mountains, and on the Virgen river, in Northern California" [now Nevada].

The odor of the bruised herbage of *Thamnosma*, when fresh, is penetrating, rank, and offensive; but the smell persisting about the dry plant is delicate and sweet. The season of blooming is not very fixed, for flowering plants were seen from January to April. It should be noted that the final word from which the name is derived (*ϑάμνος*, shrub, and *'οσμή*, odor) is feminine, and that, therefore, the spelling "*montanum*" for the specific name, which is frequently used, but which was not given with the original description, is incorrect. The plant occurred between Victor and Stoddard Wells (No. 151); between Daggett and the first divide on the road to

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[1] Hook. Fl. Bor. Amer. i. 116 (1830).

[2] Fl. Fran. 98 (1891).

Lone Willow Spring; on Browns Peak; on the mountain slope west of Lone Willow Spring; in the mountains east of Resting Springs; in the southern part of the Funeral Mountains, west of Amargosa; between Furnace Creek and Ash Meadows; between the latter point and Pahrump Valley; on the west slope of Mountain Spring Pass, Charleston Mountains; between Cottonwood Spring and Vegas Ranch (No. 396); in the northern part of Vegas Valley; on the slopes of the divide northwest of Towners; in the valley of the Virgin (No. 1931); and in Surprise (No. 653), Mill Creek, and Willow Creek cañons, Panamint Mountains. The plant is characteristic of the upper part of the Lower Sonoran zone, extending from the upper limit of *Larrea* down to about 1,000 meters. Dr. Merriam reported it also from Indian Spring Valley, California, and from the Virgin and Santa Clara valleys, Utah.

CELASTRACEÆ.

Mortonia scabrella Gray, Pl. Wright. ii. 28 (1853). Type localities, "mountain-sides, near the San Pedro, Sonora," and "mountains near El Paso."

Specimens were collected by Mr. Bailey at Overton, Nevada (No. 1933). Like others collected in southern Utah by Palmer in 1877, they differ conspicuously from typical *M. scabrella* in the size of their leaves and flowers. Their leaves are 8 to 14 mm. and their calices 5 to 6 mm. in length, while in the typical plant the same organs are only 4 to 7 mm. and 2 to 3 mm. long, respectively. The species is known in the Mexican states of Sonora and Chihuahua, in western Texas, and southern New Mexico. The localities in Utah and Nevada are about 800 kilometers northwest of any other known station.

Forsellesia nevadensis (Gray) Proc. Amer. Acad. xi. 73 (1876), under *Glossopetalon;* Greene, Erythea, i. 206 (1893). Type locality, "northern part of Washoe County, Nevada."

Crucial characters for distinguishing this plant from *G. spinescens* have not yet been found. The general characters upon which it has been separated are the larger leaves and larger, more persistent stipules.

According to specimens in the National and Gray herbaria *G. nevadense* has been collected in the original locality; on the west side of Pyramid Lake, Nevada; on hillsides near Laughton's Springs, between Reno and Verdi, Washoe County, Nevada; near Virginia City, Nevada; and at Pahroc Spring, Nevada (No. 1986 of the present collection): while *G. spinescens* has been collected from the Staked Plains of Texas to El Paso; at several points in New Mexico, Arizona, southern Utah, and southern Nevada; on the Snake River, Oregon; on the north slope of the San Bernardino Mountains; and now in the Panamint Mountains of California.

Forsellesia spinescens (Gray) Pl. Wright. ii. 29 (1853), under *Glossopetalon;* Greene, Erythea, i. 206 (1893). Type locality, "in a mountain ravine near Frontera, New Mexico."

The shrub was very scarce, being seen only in Mountain Spring Pass, Charleston Mountains (Nos. 388, 1880); in the Panamint Mountains, about the head of Johnson Cañon and in Surprise Cañon (No. 644). Only a few plants occurred at each place. All the localities were in the lower part of the Upper Sonoran zone.

RHAMNACEÆ.

Rhamnus californica Esch. Mem. Acad. St. Pet. x. 285 (1826). Type locality, "in Novae Californiae fruticetis."

South Slope of the San Bernardino Mountains (No. 126).

Since the original description of *Rhamnus californica* may be accessible to but few American botanists a literatim copy of it is given here:

> 8. RHAMNUS CALIFORNICA.
>
> R. inermis, floribus hermaphroditis monogynis fasciculato umbellatis, bacca disperma, foliis ovalibus serrulatis. In Novae Californiae fruticetis.
>
> *Frutex* biorgyalis. Caulis teres fuscus, fere glaber; ramis angulatis, cinereo tomentosis. [p. 286.]

Folia sparsa petiolata sesquipollicaria ovalia serrulata, plerumque acuta, raro obtusa, reticulato venosa, utrinque glabra. Petioli angulati tomentosi.

Inflorescentia fasciculato umbellata. Pedunculus axillaris solitarius subangulatus crassus tomentosus, longitudine petiolorum, plerumque umbellas tres sessiles multifloras gerens: altera in apice, duæ ad latera; pedicelli elongati inæquales tomentosi. Flores satis magni hermaphroditi. Calyx urceolaris quinquefidus; laciniis intus carinatis. Petala quinque squamiformia in excisuris calycis, flavo viridia. Stamina quinque. Stylus solitarius, stigmate bifido. Bacca disperma vel potius drupa bicocca.

Rhamnus crocea Nutt. in Torr. & Gr. Fl. i. 261 (1838). Type locality, "around Monterey, California."

The plant was seen on the south slope of Cajon Pass (No. 127), in the valley of Caliente Creek, and in the valley of the Kaweah River (No. 1299), in all cases growing below the chaparral belt. No. 1299 has leaves unusually large and rather thinner than usual, resembling *R. insularis*·Greene.

Rhamnus tomentella Benth. Pl. Hartw. 303 (1848.) Type locality, "in montibus Sacramento."

The type form of this species has leaves, to translate from the original description, oblong, acuminate, entire, with recurved margins, 1¼ to 2½ inches long, 6 to 9 lines wide, almost glabrous above, etc., and the whole plant is described as "flavicanti-tomentellus." In our plant the leaves are narrowly to broadly oblong, usually acuminate, the margins not involute, but closely denticulate-serrate, tomentellous beneath, in flowering specimens not exceeding 3 cm. in length, in fruiting ones reaching 6 cm. The same plant has been reported[1] from "Butte mountains, near Marysville," Butte County. It is probable that this form will prove to be sufficiently differentiated and to have a sufficiently marked range to rank as a variety of this or some other species. It appears impossible, however, to thoroughly understand a *Rhamnus* of this group from herbarium specimens alone.

Specimens were collected on the western slope of Walker Pass (No. 1024).

Ceanothus cordulatus Kellogg, Proc. Cal. Acad. ii. 124 (1861). Type locality, "Washoe," Nevada.

On Frazier Mountain (No. 1202), and in the valley of the Kaweah River (No. 1379). This species grows usually in dense clumps about a meter high and a few meters broad, with the short, spinescent branches firmly interlocked. It is a characteristic shrub of the black pine belt.

Ceanothus crassifolius Torr. Pac. R. Rep. iv. 75 (1857). Type locality, "Cajon Pass," California.

South slope of the San Bernardino Mountains (No. 118).

Ceanothus cuneatus (Hook.) Fl. Bor. Amer. i. 124 (1830), under *Rhamnus*; Nutt. in Torr. & Gr. Fl. i. 267 (1838). Type locality, "near the sources of the Multnomak River [Willamette River, in Oregon], in sandy soils, growing under the shade of *Pinus Lambertiana.*"

No. 1026, which was collected on the west slope of Walker Pass, on the transition ground of the desert and interior Californian floras, is a shrub about 2.5 meters high, with the characteristic habit of *C. cuneatus*, but the leaves have the smaller size and less cuneate character of those of *C. greggii*, and are similarly thicker and less conspicuously veined.

This species was an abundant and characteristic shrub of the foothill belt on the intramontane slope of the Sierra Nevada and San Bernardino Mountains. It was found in Cajon Pass (No. 109), on the south slope of the Sierra Liebre (Merriam), in Tejon Cañon, at many points between Walker Pass (No. 1026) and Caliente, and in the valley of Kaweah River.

Ceanothus divaricatus Nutt. in Torr. & Gr. Fl. i. 266 (1838). Type locality, "mountains of St. Barbara, California, and also near the town."

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[1] Pac. R. Rep. iv. 74 (1857).

No. 113 is the nearly entire-leafed form which has been called *C. divaricatus eglandulosus* by Torrey, and *C. eglandulosus* by Trelease. It appears, however, not to be really different from what recent authors consider the type of the species. In regard to the other two numbers Professor Greene has written me: "I put them both down without hesitancy as *C. divaricatus*, but more pubescent than the type, and leaves more constantly serrate, with the remark that if this be correct, you have finely extended the range of this species, which is not strange, seeing how little we have ever before learned about the connections of the Coast Range and Sierra floras in that region where they must naturally be expected to meet, i. e., where a sort of transverse range of the mountains connects the two." This form appears to extend along the western foothills of the southern Sierra Nevada and to connect geographically with the type form, which belongs to the coast region, through the mountains south and west of Tejon Pass. Specimens were collected in Cajon Pass (No. 113), on the western slope of Walker Pass (No. 1032), and in the valley of the Kaweah River (No. 1309). All were examined by Professor Greene.

Ceanothus diversifolius Kellogg, Proc. Cal. Acad. i. 58 (1855). Type locality, "Placerville," El Dorado County, California.

This, as already pointed out in Flora Franciscana, p. 82, is the species which was published by Dr. Watson as *C. decumbens*, and which has usually passed under that name. The plant is, as commonly described, creeping and sends up ascending branches usually 20 cm. or less long. Dr. Kellogg, in his description, evidently supposed the long creeping stems to have grown erect, for he wrote "lateral branches divaricate, slightly nodding," and "flowers in long, axillary, simple racemes, somewhat pendant."

In the forests of *Pinus ponderosa*, in the valley of the Kaweah River (No. 1376).

Ceanothus fendleri Gray, Pl. Fendl. 29 (1849). Type locality, "mountains east of Santa Fé," New Mexico.

This shrub was reported by Dr. Merriam from Mount Magruder, Charleston Mountains, and the Highland Range, Nevada, and Beaverdam Mountains, Utah. No specimens were collected.

Ceanothus greggii Gray, Pl. Wright ii. 28 (1853). Type locality, "Battlefield of Buena Vista," and "side of mountains near Frontera, New Mexico."

On the Charleston and Panamint Mountains, among the piñons, occurred a *Ceanothus* of stiff, branching, bushy habit, about 1 meter high, with thick oblong evergreen sometimes spinose-denticulate leaves about 1 cm. in length. Neither flowers nor fruit of the plant was seen. It is probably a northern outlying form of *C. greggii*. In the Charleston Mountains it was seen below Clark's sawmill and in the pass north of Olcott Peak; in the Panamint Mountains, near the head of Johnson Cañon.

Ceanothus integerrimus Hook. & Arn. Bot. Beech. 329 (1839–40). Type locality not given. The plants upon which the description was based were collected by Douglas, probably in northern California.

Frazier Mountain (No. 1208). This plant grows at a uniformly lower altitude than *C. parvifolius*, being found in the upper portion of the chaparral belt, while the other occurs only in the forests above that belt.

Ceanothus parvifolius (Wats.) Proc. Amer. Acad. x. 334 (1875), as *C. integerrimus parviflorus*; Trelease, Proc. Cal. Acad. ser. 2. i. 110 (1888). Type locality, "in the Sierra Nevada from Yosemite Valley northward."

While working in the field and observing this plant in comparison with *C. integerrimus*, I saw no intergrades between the two, and considered them distinct species. Yet I have considerable hesitation in recording that opinion because Dr. Parry, who has had the widest opportunities for observation, states in the Proceedings of the

Davenport Academy, vol. v, p. 172: "I am led to the conclusion that they properly belong to one species, of which it would be possible to make many varieties." Specimens were collected in the valley of the Kaweah River (No. 1381).

The varietal name originally published was evidently intended for *parvifolius*, and was afterwards so written by its author in the Botany of California, vol. i, p. 102.

Ceanothus pinetorum sp. nov. PLATE VI.

Plant of the sub-genus *Cerastes*, 0.6 to 1 meter high, densely branched; branches divaricate, dark brownish red when young; leaves opposite; stipules at maturity nearly as thick as broad, ovate in outline, acute, divaricate, reflexed, from 2 or 3 to 5 mm. long, light brown, glabrous, spongy, and when old powdery within; petiole 1 to 2 mm. long; blade broadly oblong, rounded at base and apex, 0.5 mm. thick, commonly 12 to 16 mm. long, glabrous or with traces of early pubescence, spinulose-dentate, with 4 to 6 teeth on each side, the under surface venose-reticulate, with minute white areolæ; flowers not collected; fruiting peduncle 0.5 to 1.5 cm. long, about 2 mm. thick; fruiting pedicel of about the same length, somewhat slenderer; fruit 7 to 9 mm. long in addition to the crests, these about 3 mm. long; seed oblong, about 4 mm. in length, black and shining at maturity.

Type specimen in the United States National Herbarium, No. 1738, Death Valley Expedition; collected August 30, 1891, near Lyon Meadow, Sierra Nevada, Tulare County, California, by Frederick V. Coville.

The species was seen only in the forests of *Pinus jeffreyi*, on the head waters of Kern River, in the valley that lies between the two main crests of the Sierra Nevada. The very large fruit, the form of the leaves, and the erect habit of the plant distinguish it from all the species of the sub-genus. In our specimens the conspicuous enlargement of the stipules is remarkable.

Ceanothus vestitus Greene, Pittonia, ii. 101 (1890). Type locality, "borders of pine forests on the mountains near Tehachapi, Kern Co., Calif."

Our plant agrees well with Professor Greene's description, but the leaves are smaller than in his type specimens. The species occurs at a higher altitude than *C. cuneatus*, growing, where we found it, on the tops of hills a short distance below the zone of *Pinus jeffreyi*, a range according with that given by Professor Greene. On the summits of some of the mountains south of Fort Tejon (No. 1194) this shrub, together with *Cercocarpus parvifolius* and *Fremontodendron californicum*, forms a dense chaparral a little below the limit of the black pine. It was seen only in this locality. The identification of the specimens was authenticated by Professor Greene.

AMPELIDACEÆ.

Vitis californica Benth. Bot. Sulph. 10 (1844), under *Vitex;* Benth. Pl. Hartw. 302 (1848). Type locality, "Rio Sacramento."

The wild grape was found at Ash Meadows; at a mound spring near Vegas Ranch; in Surprise (No. 626), Willow Creek, and Mill Creek cañons, Panamint Mountains; in the Cañada de las Uvas; at Tejon Ranch; and in the valley of the Kaweah, between Three Rivers and Kane Flat.

SAPINDACEÆ.

Æsculus californica (Spach) Ann. Sci. Nat. ser. 2. ii. 62 (1834), under *Calothyrsus;* Nutt. in Torr. & Gr. Fl. i. 251 (1838). Type locality, "in California."

This tree, the buckeye, does not occur east of the Sierra Nevada. It was first seen near Havilah, in Kern County (No. 1076). From that point south to Fort Tejon it was found abundantly, and again along the Kaweah River in the foothills of the Sierras. All these localities are on the western slope of the Sierra Nevada below the belt of chaparral.

Acer glabrum Torr. Ann. Lyc. N. Y. ii. 172 (1828). Type locality, "on the Rocky Mountains."

This maple, wherever found, attained only the dimensions of a shrub 2 meters high or less. It was collected in the Grapevine Mountains, east of Death Valley (No. 1757), and in Death Valley Cañon, Panamint Mountains (No. 2018), at an altitude, in both places, of between 6,000 and 7,000 feet.

Acer macrophyllum Pursh, Fl. i. 267 (1814). Type locality, "on the great rapids of the Columbia river."

In the Tejon Mountains (No. 1166).

Acer negundo L. Sp. Pl. ii. 1056 (1753). Type locality, "in Virginia."

The box elder of the coast region of California, considered by some a variety of *Acer negundo*, by others a distinct species, *A. californicum*, has its twigs, petioles, leaves, peduncles, and capsules tomentose. Our tree, from Cañada de las Uvas (No. 1164), which is the same as No. 264 of the Wheeler Survey, and was collected in the same locality, has these parts, with the exception of the slightly hairy lower surface of the leaves, entirely glabrous, in this respect resembling the box elder of the Atlantic States, and differing not only from the California coast tree, but from the usually tomentose form characteristic of the Great Plains and Great Basin. Dr. Merriam reported the tree in the Santa Clara Valley, Utah.

ANACARDIACEÆ.

Rhus diversiloba Torr. & Gr. Fl. i. 218 (1838). Type locality, "borders of woods &c., Oregon & California."

This, the common western poison ivy, was found at several points on rocky hillsides in the foothill belt of the western slope of the Sierra Nevada, throughout the part of it that we traversed.

Rhus ovata Wats. Proc. Amer. Acad. xx. 358 (1885). Type locality, "on hills and mountains, away from the coast, from San Diego to Los Angeles County," etc.

Near San Bernardino (No. 110). The type specimens of *Rhus* (*Styphonia*) *integrifolia* were collected 'on the margins of cliffs, &c., near the sea, around St. Diego & St. Barbara," California. *Rhus ovata*, as indicated by the type locality given above, is an inland species. Dr. Watson says (loc. cit.): "It has been confounded with the coast species *R. integrifolia* (and figured for it by Torrey in Pac. R. Rep. 7. 9, t. 2, excepting the single leaf), which has smaller obtuse and more frequently serrate leaves with shorter petioles, more pubescent, and with twice longer fruit (5 lines in diameter)."

Rhus trilobata Nutt. in Torr. & Gr. Fl. i. 219 (1838). Type locality, "in the central chain of the Rocky Mountains."

Observed at the summit of Cajon Pass; near Mountain Springs, Charleston Mountains; in Vegas Valley, near Vegas Ranch; in Johnson (No. 659) and Surprise (No. 618) cañons, Panamint Mountains; and between Havilah and Caliente; and reported by Dr. Merriam from the Pahranagat Mountains of Nevada and the Beaverdam Mountains of Utah.

LEGUMINOSÆ.

Lupinus argenteus decumbens (Torr.) Ann. Lyc. N. Y. ii. 191 (1828), as *L. decumbens;* Wats. Proc. Amer. Acad. viii. 532 (1873). Type locality, "on the southern branches of the Arkansa."

Near Mineral King, Sierra Nevada (No. 1478). The pubescence is more pronouncedly hirsute than is usual. Determined by E. L. Greene.

Lupinus brevicaulis Wats. Bot. King Surv. 53 (1871). Type locality, "in the valleys and lower cañons of Western Nevada to the East Humboldt Mountains," etc., at "5,000 to 8,000 feet altitude."

On the Darwin Mesa (No. 877), and in Boundary Cañon, Grapevine Mountains (No. 977). The flowers of this species, as it grows in the Mohave Desert at least, are of a beautiful deep violet color.

Lupinus breweri Gray, Proc. Amer. Acad. vii. 334 (1868). Type locality, "on the Yosemite trail, alt. 6,000 feet."

In the high Sierra Nevada (Nos. 1550, 1654).

Lupinus covillei Greene, Proc. Acad. Phila. 1892, 365 (1893). Type locality, "near Farewell Gap, in the Sierra Nevada of California, at an altitude of 10,000 feet."

Described by Professor Greene from specimens collected by the Death Valley Expedition at Farwell Gap (No. 1746).

Lupinus cytisoides Agardh, Syn. Lup. 18 (1835). Type locality, "in California."

Mineral King, Sierra Nevada (No. 1383).

Lupinus holosericeus Nutt. in Torr. & Gr. Fl. i. 380 (1840). Type locality, 'islands and gravelly banks of the Wahlamet," Oregon.

In the Panamint Mountains (Nos. 764, 2033, 2042).

Lupinus microcarpus Sims, Bot. Mag. l. t. 2413 (1823). Type locality not given. The type specimens were cultivated in England from seeds said to have been collected in Chili.

In Windy Gap (No. 588) and Tehachapi Valley (No. 1119). In the figure cited the leaves are narrower than in the Californian plant, but the description accords well with it.

Lupinus ornatus Lindl. Bot. Reg. xiv. t. 1216 (1828)—Dougl. MS. Type locality, "in mountain valleys, on the banks of the Spokan River, near Kettle Falls, on the river Columbia."

Specimens determined by E. L. Greene. This lupine occurred on the south slope of Browns Peak (No. 182); on the north and east slopes of Lone Willow Peak; about the head of Johnson Cañon, in Surprise Cañon (Nos. 600, 648), and in Willow Creek and Mill Creek cañons, Panamint Mountains; on both slopes of Walker Pass; and on the North Fork of Kern River, near Kernville. It was characteristic of the upper portion of the *Larrea* belt.

Lupinus pusillus Pursh, Fl. ii. 468 (1814). Type locality, "on the banks of the Missouri."

In Johnson Cañon (No. 565), and at Cottonwood Springs, Vegas Valley (No. 1876).

Medicago sativa L. Sp. Pl. ii. 778 (1753). Type locality European.

A few specimens of alfalfa were seen growing spontaneously in a cañon of the Inyo Mountains, near Swansea. The seeds were undoubtedly dropped by the adjacent roadside and grew to the flowering stage. At several places in the desert alfalfa was seen in cultivation, but it does not appear to be capable of continued independent growth.

Melilotus indica (L.) Sp. Pl. ii. 765 (1753), as *Trifolium Melilotus indica;* All. Fl. Ped. i. 308 (1785). Type locality Indian.

In the desert this was seen only at Furnace Creek Ranch (No. 574), and in a cañon near Swansea. In intramontane southern California it occurs almost everywhere, and was observed by us at many points in that region.

Trifolium involucratum Willd. Sp. Pl. iii. 1372 (1800). Type locality not given.

Near Lone Pine (No. 897).

Trifolium longipes Nutt. in Torr. & Gr. Fl. i. 314 (1838). Type locality, "valleys of the central chain of the Rocky Mountain range, and on the moist plains of the Oregon as low as the Wahlamet."

Whitney Meadows, Sierra Nevada (No. 1680).

Trifolium microcephalum Pursh, Fl. ii. 478 (1814). Type locality, "on the banks of Clarck's river."

Near Benton (No. 1813).

Trifolium monanthum Gray, Proc. Amer. Acad. vi. 523 (1865). Type locality, "moist bank by Soda Springs, Tuolumne River, alt. 8,700 feet."

Near Mineral King, Sierra Nevada (No. 1473). This little clover is a characteristic species of the high mountain region of eastern California and Nevada.

Trifolium obtusiflorum Hook. Ic. Pl. iii. t. 281 (1840). Type locality, "near Monterey, California."

Near Visalia (No. 1259).

Trifolium variegatum melananthum (Hook. & Arn.) Bot. Beech. 331 (1839–40), as *T. melananthum;* Greene, Fl. Fran. 29 (1891). Type locality not given. The plant described was collected in California by Douglas.

Near Visalia (No. 1257).

Lotus americanus (Nutt.) Gen. ii. 120 (1818), under *Trigonella;* Bischof, Del. Sem. Heidl. (1839). Type locality, "on the dry and open alluvial soils of the Missouri, from the river Platte to the Mountains."

Panamint Mountains (No. 819) and Yosemite Valley (No. 1851). This is the oldest available name for *Hosackia purshiana.*

Lotus argensis sp. nov.

Perennial, suffrutescent, about 50 cm. high, sparingly branched; stem terete, somewhat glaucous, glabrous or provided with a few inconspicuous appressed hairs; leaves sessile with a flat, linear blade 2 to 5 mm. long; leaflets 3 to 6, glabrate above, sparsely villous beneath, cuneate-oblanceolate, the largest 2 cm. long, the smaller sometimes not exceeding 5 mm., at the apex broadly obtuse, truncate, or even retuse, thick, the lateral veins not apparent, petiolules about 1 mm. long, stipules minute, brown, glanduliform; peduncles axillary, 6 to 12 cm. long, bearing at the apex a simple bract similar to one of the leaflets, 1- to 3- flowered; flower about 2 cm. long; calyx 8 to 10 mm. long, sparingly appressed-villous, oblique at the orifice, the lanceolate acute teeth of nearly equal length, half as long as the tube; petals deep yellow or partly orange, the wings and banner oblong, obtuse; ovary about 20-ovulate; capsule 3 to 4.5 cm. long, straight glabrous, 3 to 4 mm. wide; seed not mature.

Type specimen in the United States National Herbarium, No. 736, Death Valley Expedition; collected April 28, 1891, in Shepherd Cañon, Argus Mountains, Inyo County, California, by Frederick Funston.

The species appears to be most nearly related to *Lotus mearnsii.*

Lotus crassifolius (Benth.) Trans. Linn. Soc. xvii. 365 (1837), under *Hosackia;* Greene, Pittonia, ii. 147 (1890). Type locality, "California."

Valley of the Kaweah River (No. 1323).

Lotus glaber (Vogel) Linnæa, x. 591 (1836), under *Syrmatium;* Greene, Pittonia, ii. 148 (1890). Type locality not given, but necessarily in the vicinity of San Francisco, California.

This is a plant of intramontane California, found by the expedition near San Bernardino (No. 30), and at many points on the lower western slopes of the Sierra Nevada, from Fort Tejon to Kernville.

Lotus humilis Greene, Pittonia, ii. 140 (1890). Type locality, "San Bartolome Bay," Lower California.

In Johnson Cañon (No. 561). This locality is unexpectedly remote from the peninsula of Lower California, to which the species has been supposed to be confined; yet when it is considered that these two regions have much in common, the fact is not surprising, and the species may be looked for in the intervening country.

Lotus nevadensis (Wats.) Bot. Cal. i. 138 (1876), as *Hosackia decumbens nevadensis;* Greene, Pittonia, ii. 149 (1890). Type locality, "in the Sierra Nevada from the Yosemite to Sierra Co.," California.

In the Sierra Nevada of Fresno County, California (No. 1838).

Lotus oblongifolius (Benth.) Pl. Hartw. 305 (1848), under *Hosackia;* Greene, Pittonia, ii. 146 (1890). Type locality, "in vicinibus Monterey," California.

Near Lone Pine (No. 900). This species is closely related to *L. torreyi,* yet our specimens, notwithstanding their locality, have the characters of the former. After the description of *L. torreyi,* Dr. Gray says,[1] "But a comparison, which has been obligingly made at Kew, * * * shows that [*L. oblongifolius*] to be a different species of more southern habitat, to which a specimen collected in Owens Valley or at Fort Tejon seems to belong."

Lotus procumbens Greene, Bull. Cal. Acad. i. 82 (1885), under *Hosackia;* Greene, Pittonia, ii. 149 (1890). Type locality, "Tehachapi, Kern County," California.

Walker Pass (No. 1017).

Lotus tomentellus Greene, Pittonia, ii. 140 (1890). Type locality, "at Los Angeles Bay, Lower California."

In Johnson Cañon, Panamint Mountains (No. 526). Authenticated by E. L. Greene.

Lotus torreyi (Gray) Proc. Amer. Acad. viii. 625 (1873), under *Hosackia;* Greene, Pittonia, ii. 146 (1890). Type locality, "Sierra Nevada, California, along the shady banks of streams, at the elevation of 4,000 feet and upwards."

In the Sierra Nevada (Nos. 1848, 2099). In this species the keel and wings, as observed by us, were not white, as they are described, but of a pale cream-yellow in striking contrast with the lemon-yellow of the standard.

Psoralea californica Wats. Proc. Amer. Acad. xii. 251 (1877). Type locality, "at McGinnis' Ranch, near head of Salinas River, 25 miles from San Luis Obispo, California."

In the southern Sierra Nevada, near Kernville (No. 1047).

Psoralea castorea Wats. Proc. Amer. Acad. xiv. 291 (1879). Type locality, "near Beaver City, S. Utah, on sandy ridges."

Valley of the Virgin River, Nevada (No. 1930).

Dalea fremontii Gray, Pl. Thurb. 316 (1854)—Torr. MS. Type locality, "mountains of the Pah-Utah country, S. W. California," a very indefinite locality.

An abundant shrub on the lower mountain slopes in the Lower Sonoran zone. It was observed on the first divide north of Daggett, extending down into Paradise Valley; at the western foot of Pilot Knob; in the mountains west of Lone Willow Tanks, from 675 to 1,430 meters; on Browns Peak; in the mountains east of Resting Springs, at 750 meters; in the northern part of Resting Springs Valley; in the Funeral Mountains, west of Amargosa, from 760 to 1,575 meters; between Furnace Creek and Ash Meadows; near the Devil Hole, Ash Meadows; between Ash Meadows and Pahrump, beginning at 850 meters; on the east side of Pahrump Valley, beginning at 910 meters; on the eastern slope of the Charleston Mountains, extending up to 1,370 meters; in the northern part of Vegas Valley at about 1,050 meters; on the divide between Towner's and Ash Meadows; near the mouth of Johnson Cañon, at about 350 meters, extending up the cañon to about 1,500 meters; in Willow Creek and Mill Creek cañons, Panamint Mountains; at several points between Lone Pine and Walker Pass, beginning at 600 meters. Dr. Merriam reported the plant from Deep Spring Valley, California; and from Pahranagat, Fish Lake, and Indian Spring valleys, and Gold Mountain, Nevada.

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[1] Proc. Amer. Acad. viii. 626 (1873).

Dalea johnsoni Wats. Bot. King Surv. 64 (1871). Type locality, "near St. George on the Virgin River, Utah."

Specimens were collected by Dr. Merriam and Mr. Bailey at St. George, Utah (No. 1953). The species has a very restricted range, having been found, so far as known, only in Washington County, Utah, and in the wash of the Diamond River, northwestern Arizona, near its junction with the Grand Cañon of the Colorado (Lemmon, 1884). Dr. Merriam found a *Dalea*, which he supposes to be of this species, on the eastern slope of the Beaverdam Mountains.

Dalea mollis Benth. Pl. Hartw. 306 (1848). Type locality, "in vicinibus Monterey."

This plant has not been rediscovered at Monterey, and as it is a species characteristic of the lower Great Basin region, the locality given by Bentham is probably, as suggested by Dr. Watson in the Botany of California, erroneous.

Specimens were first observed at Bennett Wells in Death Valley, and afterward at other points as follows: in a cañon of the Funeral Mountains, opposite Bennett Wells; in Furnace Creek Cañon; at Resting Springs; between Ash Meadows and Pahrump; in the Vegas Wash (No. 1894); on the mesa between Bennett Wells and Johnson Cañon (No. 474); in Panamint Valley near the mouth of Hall Cañon, and in Surprise Cañon.

This is one of the characteristic plants of the Lower Sonoran. Its favorite habitat is hot gravel-beds such as occur in the bottoms of cañons and on the slopes between mountains and valley-bottoms.

Dalea polyadenia Torr. in Wats. Bot. King Surv. 64 (1871). Type locality, "border of Truckee Desert, Nevada."

Dr. Watson has described[1] from "Owen's Valley" a variety, *subnuda*, of this species. Our plant from its locality might be expected to belong to this variety, but it appears to differ in no essential detail from the type form.

A leafless *Dalea*, which I take to be of this species, was seen in January in Paradise Valley, and a few plants occurred on the south slope of Browns Peak (No. 172), but the species was not met with again until we reached Owens Valley. It occurred there between Keeler and Lone Pine (No. 950), between Keeler and Darwin, and between Lone Pine and Olancha, growing in arid gravelly or sandy soil. Dr. Merriam found it also in Leach Point Valley and Deep Spring Valley, California; in Fish Lake Valley, Grapevine Cañon, Sarcobatus Flat, Oasis Valley, and Pahranagat Valley, Nevada; and at the great bend of the Colorado River.

Robinia neomexicana Gray, Pl. Thurb. 314 (1854). Type locality, "Dry hills on the Mimbres, New Mexico."

Reported by Dr. Merriam from the Santa Clara Valley and the eastern slope of the Beaverdam Mountains, Utah.

Astragalus amphioxys[1] Gray, Proc. Amer. Acad. xiii. 366 (1878). Type locality, "Southern Utah and New Mexico and Northern Arizona."

In the Panamint Mountains (Nos. 496, 543).

Astragalus atratus Wats. Bot. King Surv. 69 (1871). Type locality, "on the Pah-Ute, Havallah, and Toyabe ranges, Nevada; 6-7,000 feet altitude."

On the Darwin Mesa (No. 792), and near Mineral King in the Sierra Nevada (No. 1561).

Astragalus beckwithii Torr. & Gr. Pac. R. Rep. ii. pt. ii. 120 (1855). Type locality, "on the Cedar Mountains, west of Lone Rock, and south of Great Salt Lake," Utah.

Telescope Peak (No. 2022).

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[1] Bot. Cal. ii. 441 (1880).

[1] The species of *Astragalus* were determined by Mr. E. P. Sheldon.

Astragalus calycosus Wats. Bot. King Surv. 66 (1871)—Torr. MS. Type locality, "West Humboldt, East Humboldt, and Clover Mountains, Nevada; 8,000 to 11,000 feet altitude."

Inyo Mountains (No. 1780). The description and figure given by Dr. Watson fully characterize the species. The "silvery-sericeous" pubescence is made up of pick-shaped hairs.

Astragalus casei Gray, Bot. Cal. i. 154 (1876). Type locality, "high plateau near Pyramid Lake, N. W. Nevada."

In the valley of Willow Creek, Panamint Mountains (Nos. 747, 783). This species has not been reported before from California.

Astragalus coccineus Brandegee, Zoe, ii. 72 (1891). Type localities "near the summit of the Inyo Range", and "at Lone Pine on the slopes of Mount Whitney".

This is a plant described by Dr. Watson[1] in 1882 as *A. grandiflorus*, his specimens coming from the northern slope of the San Bernardino Mountains, in the edge of the Mohave Desert. An *Astragalus grandiflorus*, however, was described by Pallas in 1800. Our specimens were collected in Johnson Cañon, Panamint Mountains (No. 491), the only point at which the species was observed. The flowers when fresh are of a bright scarlet color, and are among the first to open, at this altitude, in the spring. They form a most brilliant and beautiful feature of the flora. The same plant was collected by Mr. C. R. Orcutt on the western borders of the Colorado Desert in April, 1889, and the name *Astragalus purshii coccineus* was given to it by Parry, without description, in West. Amer. Sci. vii. 10 (1890). The localities here mentioned are all that have been reported for this plant. It is clearly a species characteristic of the mountain slopes of ultramontane California, and appears to be confined to the regions of the Mohave and Colorado deserts, in Inyo, San Bernardino, and San Diego counties.

Astragalus eremicus Sheldon sp. nov.

Annual, erect, 7.5 to 13 cm. high, loosely branching from the base; stems pubescent with white, appressed, at length spreading hairs; leaves 4 to 5 cm. long, petioles thickish; leaflets 7 to 11, oblanceolate to obovate, retuse, silvery-silky with close, appressed hairs; stipules deltoid-acuminate, usually reflexed; peduncles shorter than the leaves; racemes capitate or subcapitate; flowers small, 6 to 7 mm. long; calyx campanulate with short, acute teeth, whitened with long, appressed hairs; corolla ochroleucous, petals tipped with purple; pod ovate, membranaceous, sessile in the calyx, nearly glabrous or with minute, scattered pubescence, 1.2 to 2 cm. long, didymous, completely 2-celled, minutely mottled and minutely reticulated throughout.

Type specimen in the United States National Herbarium, No. 888, Death Valley Expedition; collected June 7, 1891, near Lone Pine, Inyo County, California, by Frederick V. Coville.

This plant is nearly related to *Astragalus platytropis* Gray, and *Astragalus coulteri* Benth. The appressed pubescence and peculiar pod are characteristic.

Astragalus inyoensis Sheldon sp. nov.

Perennial; stem erect, glabrous or sparingly hirsute, with short, appressed hairs, 30 to 60 cm. high, loosely branching; leaves 2 to 5 cm. long, mostly attached at right angles to the stem; leaflets 16 to 20, oval or obovate, obtuse or retuse, 4 to 6 mm. long, petiolulate, smooth above, but minutely canescent with short, appressed hairs beneath; stipules triangular, acute, reflexed; peduncles elongate, 5 to 10 cm. long, minutely appressed-hairy; racemes capitate at first, at length open; flower 6 to 10 mm. long; calyx obliquely attached to the pedicel, tube campanulate, teeth acute; corolla purple; pod one-celled, membranaceous, inflated, oblong-ovate, finely reticulated, short-stipitate, purplish-mottled, and sparingly pubescent, at least when young.

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[1] Proc. Amer. Acad. xvii. 370 (1882).

Type specimen in the United States National Herbarium, No. 791, Death Valley Expedition; collected May 20, 1891, on the Darwin Mesa, near Mill Creek Divide, Inyo County, California, by Frederick V. Coville.

The species clearly belongs to the section of the genus known as the *Inflati*.

Astragalus mohavensis Wats. Proc. Amer. Acad. xx. 361 (1885). Type locality, "in a cañon south of Newberry Spring in the Mohave Valley," California.

Corolla 4 to 6 mm. long, calyx 2 to 3 mm. long. Specimens were collected in Surprise (Nos. 630, 647) and Johnson (Nos. 495, 501) cañons, Panamint Mountains, and near Hot Springs, Panamint Valley (No. 685).

Astragalus nuttallianus canescens Torr. & Gr. Pac. R. Rep. ii. pt. iv. 163 (1855). Type locality[1], "New Mexico".

Johnson Cañon (No. 513).

Astragalus obscurus Wats. Bot. King Surv. 69 (1871). Type locality, "on rocky foot-hills near Truckee Pass, Nevada; 5,500 feet altitude."

About 30 kilometers east of Panaca, Utah (No. 1975); not in fruit. The floral characters are here appended: flowers rather small; petals purplish; keel less strongly arched than in *Astragalus atratus* Wats., the apex ascending, equaling the entire wings, and shorter than the broadly orbicular banner.

Astragalus oocarpus Gray, Proc. Amer. Acad. vi. 213 (1864). Type locality, "mountains east of San Diego, California."

Tehachapi Valley (No. 1112).

Astragalus oöphorus Wats. Bot. King Surv. 73 (1871). Type locality, "Reese River Pass of the Shoshone Mountains, Nevada; 5,500 feet altitude."

Near Shoal Creek, Utah (No. 1965). A low form with flowers longer than in the type and with leaflets more numerous.

Astragalus panamintensis Sheldon sp. nov.

Perennial, erect, 10 to 15 cm. high, much branched from a somewhat woody base; stems rather short; the whole plant sparingly pubescent with short, white, appressed hairs; leaves long and slender (7.5 to 12.5 cm.); leaflets 4 or 5 pairs, 4 to 6 mm. long, linear, acute, slightly emarginate, somewhat falcate, at least after drying; stipules small, triangular, acute; peduncles slender, shorter than the leaves, 2- to 3-flowered; flowers 1.25 to 1.5 cm. long; calyx nigrescent, with teeth as long as the narrowly campanulate tube; petals ochroleucous, tipped with purple; pod linear, 1.2 cm. long, short-stipitate, chartaceous, almost glabrous, minutely purplish-mottled, straight, with deep dorsal sulcus, nearly 2-celled, cross-section Y-shaped.

Type specimen in the United States National Herbarium, No. 606, Death Valley Expedition; collected April 13, 1891, in Surprise Cañon, Panamint Mountains, Inyo County, California, by Frederick V. Coville.

The plant has the aspect of an upright form of *Astragalus tegetarius* Wats., but is more nearly related to *Astragalus atratus* Wats.

Astragalus procerus Gray, Proc. Amer. Acad. xiii. 369 (1878). Type locality, "near St. Thomas, S. E. Nevada, at the confluence of Muddy River with the Virgen."

Vegas Valley, Nevada (No. 398). The plant has not been reported before from California.

Astragalus purshii Hook. Fl. Bor. Amer. i. 152 (1834)—Dougl. MS. Type locality, "on the low hills of the Spokan River, North-West America."

In the Panamint (No. 728) and Tejon (No. 1196) mountains. The latter is a dwarf form with shorter flowers than in the type and with petals purple-tipped. No. 728

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[1] Gray, Pl. Wright. i. 52 (1852).

is a small-leafed form resembling the prevailing northern forms of this species as found in Montana, Idaho, and Washington.

Astragalus triflorus Gray, Pl. Wright. ii. 45 (1853). Type locality of Gray's plant, "sandy banks of the Rio Grande below El Paso." The *Phaca triflora* of De Candolle, Astrag. 50 (1802), appears, from an examination of the original description and plate, to be clearly a different plant. It came from Peru.

In Furnace Creek Cañon (No. 363), and on the western slope of the Charleston Mountains (No. 373).

Astragalus virgineus Sheldon sp. nov.

Annual, erect, 5 to 10 cm. high, loosely branching, pubescent throughout with short, spreading hairs; leaves 2.5 to 3.7 cm. long; leaflets 3 to 6 mm. long, obtuse; stipules triangular-acute; peduncles as long as the leaves; racemes short-capitate, 3- to 6-flowered; flowers small, 4 to 6 mm. long; calyx teeth subulate, spreading, longer than the subcampanulate tube, corolla ochroleucous; pod 6 to 10 mm. long, coriaceous, obovate, one-celled, transversely rugose, sessile in the calyx, woolly pubescent with straight white hairs.

Type specimen in the United States National Herbarium, No. 1910, Death Valley Expedition; collected May 6, 1891, below St. George, in the valley of the Virgin River, Lincoln County, Nevada, by Vernon Bailey.

The species is nearest to *Astragalus aridus* Gray, but is much lower and has a shorter, non-gibbous pod.

Glycyrrhiza lepidota Pursh, Fl. ii. 480 (1814). Type locality, "on the banks of the Missouri."

No specimens of *Glycyrrhiza* were collected west of the Sierra Nevada, although they were abundant near Visalia. The plant occurring in that region is probably the variety *glutinosa*. The fruit of this species, covered as it is with hooked spines, resembles the fruit of *Xanthium strumarium*, and like it is very annoying in the manes and tails of horses.

The plant was recorded from Pahrump Valley, Ash Meadows, Lone Pine (No. 895), Olancha, South Fork of Kern River, and Tehachapi Cañon. It grows best in rich, moist, slightly alkaline loam.

Vicia californica Greene, Fl. Fran. 3 (1891). Type locality, "Calaveras Co.," California.

Tehachapi Valley (No. 1120).

Lathyrus paluster L. Sp. Pl. ii. 733 (1753). Type locality European.

Grapevine Mountains (No. 1760).

Cassia armata Wats. Proc. Amer. Acad. xi. 136 (1876). Type locality, "in the mountains of S. California, between Fort Mohave and Cajon Pass."

This was first seen between Stoddard Wells and Daggett (No. 133). It occurred in the vicinity of the latter place and northward in the desert about 15 miles, nearly to the first high divide. Afterward it was found again along the northwest foot of Pilot Knob, at Lone Willow Tanks, at the south foot of Browns Peak, in Long Valley, on a spur of the Funeral Mountains between Saratoga Springs and Amargosa, and on the eastern slope of the same range, west of the latter place. Dr. Merriam reported the plant also from Leach Point Valley and the great bend of the Colorado River. Its habitat is usually the dry, sandy beds of shallow washes in the open desert, and its common companion is *Hymenoclea salsola*. It cannot be considered an abundant shrub, yet over a comparatively restricted portion of the desert it occurred frequently. The species is particularly interesting in the fact that, while belonging to a characteristically tropical and subtropical genus, the species of which nearly all have a large leaf surface adapted to moist climates, this one, departing from the typical form, has developed thickened epidermal structures and small, early deciduous leaflets, characters common in desert shrubs.

Cercis occidentalis Gray, Pl. Lindh. ii. 177 (1850)—Torr. MS. Type locality not given, but reference is made to the Californian plants of Fremont and Hartweg.

Specimens were collected on the South Fork of Kern River (No. 1027), and others were observed in the valley of the Kaweah River both above and below Kane Flat. The species has been supposed to be confined to that part of California west of the Sierra Nevada, but it has now been collected (No. 1883) in the Charleston Mountains, Nevada; and in 1889 it was collected by Mr. F. H. Knowlton in Arizona, on the Grand Cañon of the Colorado, at a point nearly north of San Francisco Mountain.

Prosopis juliflora (Swartz) Fl. Ind. Occ. ii. 986 (1800), under *Mimosa;* DC. Prodr. ii. 447 (1825). Type locality, "in siccissimis campis Jamaicae." This may have been published earlier in Swartz's Prodromus. The specific name used by Swartz is *piliflora*, which is, on the authority of Bentham, a typographical error for *juliflora.*

The mesquite tree, characteristic of desert areas with moist subsoil, was widely scattered over the region traversed by the expedition. The numerous stations occur in the following localities: along the west side of Death Valley, several miles both north and south of Bennett Wells; in Furnace Creek Cañon and on the edges of the broad mesa at its mouth; at a few points between Salt Wells and Saratoga Springs; along the Amargosa near the latter place; scattered over large areas in Resting Springs Valley, Pahrump Valley, Vegas Valley, Vegas Wash, Ash Meadows, Panamint Valley, and in several cañons of the Funeral and Panamint mountains. The highest point at which it grew was in Johnson Cañon, at Pete's garden, at the altitude of about 1,725 meters, a short distance above the upper limit of *Larrea.* Along the Mohave River, and in Owens Valley, the southern and western parts of the desert region traversed, it did not occur. Specimens were collected near Mesquite Well in Death Valley (No. 192). The largest specimen seen was in Death Valley between Mesquite and Bennett wells. It was about 10 meters high, with a spread of branches 25 by 30 meters, and its trunk measured 1.82 meters in circumference. The tree is of great importance to travelers, since its hard mahogany-like wood furnishes excellent fuel. Growing in moist soil, frequently in the vicinity of springs, it is therefore often conveniently situated near camping places. The ranchers at Ash Meadows, Resting Springs, and Furnace Creek used it almost exclusively for fuel, and the Eagle Borax Works in Death Valley employed it for the same purpose so extensively as to exhaust the whole supply in the vicinity.

A curious appearance is sometimes presented from the drifting of sand about the trees. Their low branches offer an excellent windbreak, and the dry sand blown along by the wind is deposited beneath them. Frequently after the lapse of many years a sand-hill 3 to 5 meters high is accumulated, from the surface of which the branches of the mesquite project in all directions like so many small shrubs. If the trees stand close together in rows or in groups, sand-hills of corresponding shape are formed, while single trees are often imbedded in rounded dome-like mounds of regular form. In Death Valley, between Mesquite and Salt wells, these sand-hills are especially well developed.

In the higher parts of Resting Springs Valley the mesquite is often reduced to the form of a procumbent shrub whose branches rise not more than a meter from the ground.

Prosopis pubescens Benth. Lond. Journ. Bot. v. 82 (1846.) Type locality, "California between San Miguel and Monterey." The original specimens were collected by Thomas Coulter. The plant does not occur in that part of California to which reference is made, but Coulter's specimens probably came from some point in Mexico associated with towns of the same name as those cited by Bentham.

This tree, the screw bean, has practically the same range as *P. juliflora*, and while less abundant than that species, is almost invariably accompanied by it. It occurred at the old Eagle Borax Works, in Death Valley; in Furnace Creek Cañon; along the Amargosa, near Saratoga Springs, on the authority of Mr. Nelson; at several points in Resting Springs Valley; at Ash Meadows; near Cottonwood Springs, Vegas Valley; in the Vegas Wash; at Corn Creek, Vegas Valley; in Surprise Cañon, Panamint Mountains; and at Hot Springs, Panamint Valley. The largest specimen observed was near the south end of Resting Springs Valley. At about a meter from the ground its trunk measured 1.64 meters in circumference, while at the base it had several branches and was much larger. The tree is a beautiful one, its narrow outline and ascendant branches giving it a strikingly different appearance and much more graceful figure than *P. juliflora*, with its rounded or depressed form and divergent crooked branches.

Acacia greggii Gray, Pl. Wright. i. 65 (1852). Type localities, "Western Texas," and "dry valley west of Patos, Northern Mexico."

This shrub or small tree, the cats claw, was seen at Cottonwood Springs, Lincoln County, Nevada, and near the mouth of the Vegas Wash. It appears to have extended northward through the valley of the Colorado River, but not to have spread very far away from it. In the region traversed by the expedition it did not occur west of the Charleston Mountains. Dr. Merriam reported it farther east, at Bitter Springs in the Muddy Mountains, and in the valleys of the Virgin and Muddy to the junction of the former with Beaverdam Creek, in extreme northwestern Arizona.

ROSACEÆ.

Prunus andersonii Gray, Proc. Amer. Acad. vii. 337 (1868). Type locality, "foothills of the eastern side of the Sierra Nevada, near Carson."

Observed only in Willow Creek Cañon, Panamint Mountains (No. 840); in the Coso Mountains (No. 883); and on the slopes of Walker Pass. A specimen of *Prunus* that was seen in winter near the head of Johnson Cañon, in the Panamint Mountains, and which was not *P. fasciculata*, probably belongs also to this species. The few specimens of *P. andersonii* that were found grew near the line between the Upper and Lower Sonoran zones.

Prunus demissa (Nutt.) in Torr. & Gr. Fl. i. 411 (1840), under *Cerasus;* Walp. Rept. ii. 10 (1843). Type locality, "plains of the Oregon towards the sea, and at the mouth of the Wahlamet."

Near Havilah, Kern County, California (No. 1079). Dr. Merriam found a chokecherry at Sheep Spring, in the Juniper Mountains, Nevada, but collected no specimens of it.

Prunus emarginata (Dougl.) in Hook. Fl. Bor. Amer. i. 169 (1834), under *Cerasus;* Walp. Rept. ii. 9 (1843). Type locality, "on the upper part of the Columbia River, especially about the Kettle Falls."

The plant here designated is a shrub 1.5 to 2.5 meters high, with bright red astringent and bitter fruit. It was seen along the Kaweah River road, a few kilometers below Mineral King, and again in the Sierra Nevada between Trout Meadows and the Kern River Lakes, in both places growing among the black pines.

Prunus fasciculata (Torr.) Pl. Frem. 10 (1853), under *Emplectocladus;* Gray, Proc. Amer. Acad. x. 70 (1874). Type locality, "Sierra Nevada of California; probably in the southern part of the range."

The leaves of this plant have always been described as entire, but some of our specimens, and others collected by Palmer in southern Utah, have often 1 or 2 teeth on either side. The leaves are also puberulent, at least when young, thus distinguishable from those of *P. andersonii*, and they sometimes attain a length of 2 cm.

The flowers are polygamo-diœcious, a fact which explains Dr. Gray's difficulty[1] in identifying Torrey's plants with others subsequently collected. In the prevailingly male flowers the petals, in our specimens, are elliptical-lanceolate, appressed-strigose on the back, 3 to 3.5 mm. long; the filaments 2 mm., and the anthers 1 to 1.2 mm., in length, while the style is 1 to 2 mm. long, and the pistil sterile. In the fertile flowers the petals are ovate, glabrous on the back, 2 to 3 mm. long. the filaments 0.6 to 0.8 mm., the anthers 0.4 mm., and devoid of pollen, and the style about 2 mm. long. The sterile flower is the one figured by Torrey (loc. cit. pl. v.). The form and length of the petals probably vary considerably.

The shrub was seen within the yucca belt, between Cajon Pass and Hesperia; on the northeast slope of Lone Willow Peak; in a cañon of the Funeral Mountains, west of Amargosa; near Mountain Springs Pass, in the Charleston Mountains (No. 1881); near Cottonwood Springs, Vegas Valley; on the west slope of the divide northwest of Towner's; in Johnson (No. 555), Willow Creek (No. 767), and Mill Creek (No. 801) cañons, Panamint Mountains; and on both slopes of Walker Pass. It grows usually in cañons or on rocky slopes, in the upper altitudes of the Lower Sonoran zone, and in the lower part of the Upper Sonoran. The fruit resembles a small almond. Dr. Merriam reports the plant from the White Mountains of California; from Mount Magruder, Gold Mountain, the Highland Range, Pahroc Mountains, and Juniper Mountains, in Nevada; and the Beaverdam Mountains and upper Santa Clara Valley, Utah.

Prunus ilicifolia (Nutt.) in Hook. & Arn. Bot. Beech. 340 (1840–41), under *Cerasus;* Walp. Rept. ii. 10 (1843). Type locality not given; but the plant was described from specimens collected by Douglas.

This tree was seen only along the margins of the San Bernardino Valley and on the south slope of Cajon Pass (Nos. 45, 114). It is a species belonging distinctively to intramontane California.

Luetkea cæspitosa (Nutt.) in Torr. & Gr. Fl. i. 418 (1840), under *Spiræa;* Kuntze, Rev. Gen. Pl. i. 217 (1891). Type locality, "on high shelving rocks in the Rocky Mountains, towards the sources of the Platte."

A plant undoubtedly referable here was found in winter on the western slope of the Charleston Mountains, below Clark's sawmill.

Basilima millefolium (Torr.) Pac. R. Rep. iv. 83 (1857), under *Spiræa;* Greene, Fl. Fran. 57 (1891). Type locality, "low hills and valleys, near Williams' mountain," Arizona.

On the summit of Telescope Peak (No. 2038), and on the east slope of the Panamint Mountains, near Johnson Cañon, at 2,620 meters; in Wood Cañon, Grapevine Mountain, (No. 1758); in the Beaverdam Mountains, Utah (Merriam); and along the Hockett Trail, on the eastern slope of the Sierra Nevada, at 2,350 meters.

Holodiscus discolor (Pursh) Fl. i. 342 (1814), under *Spiræa;* Maxim. Adn. Spir. 257 [150] (1879). Type locality, "on the banks of the Kooskoosky," a river in Idaho, now known as the Clearwater.

The plant here referred to is a bushy shrub 0.8 to 1.5 meters high, with leaves not exceeding 2 cm. in length. It is called in the Botany of California *Spiræa discolor dumosa*, and is undoubtedly the same as *S. dumosa* Hooker[2] the type specimens of which were collected by Geyer in "stony and sandy places of Platte River." Some doubt has existed, however, whether Pursh's plant was really this or the *Spiræa ariæfolia* of Smith.[3] This doubt was expressed at one time by Gray,[4] while speaking of the so-called *S. dumosa*, as follows: "This is * * * a good species; but the original *S. discolor*, Pursh, I believe to be only *S. ariæfolia;* as certainly is a plant of

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[1] Proc. Amer. Acad. x. 70 (1874).

[2] Lond. Journ. Bot. vi. 217 (1847)—Nutt. MS.

[3] Rees, Cycl. xxxiii (1819).

[4] Gray, Pl. Fendl. 40 (1849).

Menzies so named by Pursh in Herb. Lambert." There can be no reasonable doubt, however, that the well-known *S. dumosa* is the same as Pursh's plant, for it is known now that *S. ariæfolia* is a tall, tree-like shrub, often 5 meters high, and is confined to a narrow strip along the Pacific coast, while Pursh's type was from the Rocky Mountains of Idaho, and was described by him as "a shrub about 5 feet high." The Rafinesquian name *Schizonotus* cannot be retained for this genus because Lindley had previously enployed the same name for Rafinesque's *Basilima*.

Specimens were seen between Mineral King and Farewell Gap (No. 1490), in the Sierra Nevada; along the Hocket Trail, on the eastern slope of the same range; and in Death Valley Cañon (No. 2016) and Telescope Peak (No. 2030), Panamint Mountains.

Adenostoma fasciculatum Hook. & Arn. Bot. Beech. 139 (1832). Type locality, "in sandy plains in the Bay of Monterrey."

This shrub is abundant from the base of the San Bernardino Mountains (No. 103) nearly to the summit of Cajon Pass, and forms an important part of the dense chaparral which covers the southern slope of these mountains below the forests. On the western slope of the Sierra Nevada it was seen under similar conditions, but less abundant, a few miles above Three Rivers, along the east branch of the Kaweah River (No. 1301).

Rubus parviflorus Nutt. Gen. i. 308 (1818). Type locality, "on the island of Michilimackinak, lake Huron."

On the western slope of the Sierra Nevada (Nos. 1341, 1842).

Rubus vitifolius Cham. & Schlecht. Linnæa, ii. 10 (1827). Type locality, "San Francisco, Californiae."

This plant, commonly known under the name *R. ursinus* Cham. & Schlecht.,[1] occurred in the cañon west of Tejon Ranch, on the western slope of the Sierra Nevada.

Kunzia glandulosa (Curran) Bull. Cal. Acad. i. 153 (1885) under *Purshia;* Greene, Pittonia, ii. 299 (1892). Type locality, "On the Mojave side of Tehachapi Pass."

This plant is readily distinguished from *Kunzia tridentata* by its leaves, those of the latter being narrowly cuneate-obovate, tapering evenly from base to apex, 3- or rarely 5-toothed or lobed at the apex, densely white-cobwebby over the entire surface beneath, sparingly so above, not resinous-punctate on the upper surface; while those of the variety have a narrow, linear, petiole-like base, abruptly expanding into a cuneate-obovate blade 3- to 5-parted into linear divisions, white-cobwebby beneath only in the narrow lines between the veins and the margins of the leaf-parts, and with a few conspicuous resinous dots on the usually glabrous upper surface. Indeed the leaves of *K. glandulosa* so exactly resemble those of *Cowania mexicana* (which are usually, however, 5- to 7-lobed) that the writer is not always able to distinguish them. The two species of *Kunzia* differ, in addition, in the general canescent appearance of *K. tridentata* and the green color of *K. glandulosa,* and are said to differ further in habit and in the fruit.

The shrub was found in the Charleston Mountains, on the road to Clark's sawmill (No. 299); at the head of Willow Creek (No. 768) and Mill Creek cañons, Panamint Mountains; in the Coso Mountains, near Crystal Spring; and on the east slope of Walker Pass. It occupied in these places a position just below the nut pines or in their lower edge, and well above the upper limit of *Larrea*. All the specimens collected from the Charleston Mountains. Nevada, westward clearly belong to *K. glandulosa,* and show no variation toward *K. tridentata*; but Mr. Bailey collected on the Beaverdam Mountains (No. 1947), just within the border of Utah, along with *K. tridentata,* a form of *K. glandulosa* varying decidedly in the direction of the other species.

As *Kunzia, Cowania,* and *Fallugia* are so often confused by those not well acquainted with all of them, the following artificial key to our four commoner species may be found useful:

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[1] See Greene, Fl. Fran. 72 (1891).

Leaves gradually expanding from a narrow base to a blade several times broader above..*Kunzia tridentata*
(Additional characters: pistils 1 or 2; fruiting style not exceeding 7 mm. long, its hairs very short and close; flowers yellow.)
Leaves with linear, petiole-like blade and linear lobes.
Fruiting style as above....................................*Kunzia glandulosa*
(Additional characters: leaves 10 mm. or less long; pistils 1 or 2; calyx-tube minutely densely tomentose, its glands, if any, sessile; flowers yellow.)
Fruiting style 25 to 50 mm. long, plumose with hairs about 18 mm. long.
Pistils 5 to 10; flowers cream-colored......................*Cowania mexicana*
(Additional characters: leaves 12 mm. or less long.)
Pistils about 50 to 100; flowers pure white................*Fallugia paradoxa*
(Distinguished further from all the others by its calyx, subulate-appendiculate between the lobes, and by its leaves, often 2 cm. long and with brown hairs, stellate beneath when young.)

Kunzia tridentata (Pursh) Fl. i. 333 (1814), under *Tigarea;* Spreng. Anleit. ed. 2. ii. 869 (1818). Type locality, "In the prairies of the Rocky-mountains and on the Columbia river."

This is the *Purshia tridentata* of most authors. Specimens were collected by Mr. Bailey on the Beaverdam Mountains of Utah (No. 1946). Dr. Merriam has reported *Kunzia* from many points along his route from Colorado to the Sierra Nevada. The majority of these localities probably are those of *K. glandulosa*, but the lack of specimens prevents positive identification. The localities are as follows: White Mountains of California, Mount Magruder, Gold Mountain, Timpahute, Pahranagat, Hyko, Pahroc, and Juniper Mountains of Nevada, and the Upper Santa Clara Valley and Beaverdam Mountains of Utah.

Coleogyne ramosissima Torr. Pl. Frem. 8 (1853). Type locality, "sources of the Mohave and Virgin Rivers, tributaries of the Colorado of the West, in the mountains of Southern California."

This plant was abundant in the upper altitudes of the Lower Sonoran zone almost throughout the Mohave Desert region. It was found between Victor and Daggett; at Copper City Spring and along the southwestern base of Pilot Knob; on Lone Willow Peak, from 1,100 to 1,825 meters; on the western slope of the Charleston Mountains, beginning at 1,035 and 1,300 meters; in the Funeral Mountains, west of Amargosa, beginning at 1,235 meters; between Cottonwoood and Vegas springs; in Johnson Cañon, at 1,700 and 1,860 meters; in Willow Creek and Mill Creek cañons, Panamint Mountains; and on the eastern slope of the Sierra Nevada near Lone Pine, its upper limit at 1,890 meters. Dr. Merriam found it on Hungry Hill Summit, Timpahute, Desert, and Pahranagat mountains, and in Pahranagat Valley, Nevada; and in the Beaverdam Mountains and the Santa Clara Valley, Utah.

Chamaebatia foliolosa Benth. Pl. Hartw. 308 (1839). Type locality "in montibus Sacramento."

Valley of the Kaweah River (No. 1307).

Cercocarpus intricatus Wats. Proc. Amer. Acad. x. 346 (1875). Type locality, "on rocky mountain sides near the mouth of the American Fork Cañon in the Wahsatch."

Mr. Marcus E. Jones considers this plant a variety of *C. ledifolius*[1].

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[1] For further notes see Zoe, ii. 14 (1891), ii. 245 (1891), and iii. 298–300 (1893).

A single plant was seen among the yellow pines on the west slope of the Charleston Mountains, near Clark's sawmill. It did not exceed 1.5 meters in height, and was conspicuously different from *C. ledifolius* in its small size, interlaced branchlets, and minute leaves. Mr. Bailey afterwards collected flowering specimens in Death Valley Cañon, Panamint Mountains, at an altitude of 6,375 feet (No. 2019).

Cercocarpus ledifolius Nutt. in Torr. & Gr. Fl. i. 427 (1840) Type locality, "Rocky Mountains, in alpine situations on the summits of the hills of Bear River of Timpanagos, near the celebrated '*Beer Springs.*'" Beer Springs, now known as Soda Springs, is situated in Bingham County, southeastern Idaho.

This tree, the mountain mahogany, occurred on the west slope of the Charleston Mountains, near Clark's saw-mill; in the Panamint Mountains, at and north of Panamint Pass; on Mount Magruder (Merriam); and on the eastern slope of the Sierra Nevada, along the Hockett trail. It was characteristic of the belt of yellow pine and the upper portion of the piñons. In the Panamint Mountains individual trees were large and robust, and some grew to a remarkable size. A tree seen April 2, 1891, on their eastern slope north of Johnson Cañon, had three main branches of nearly equal size, springing from a single trunk close to the ground. The largest of these branches measured 1.52 meters in circumference. The whole tree did not exceed 4.5 meters in height.

Cercocarpus parvifolius Nutt. in Hook. & Arn. Bot. Beech. 337 (1840–41). Type locality, "on the Platte River." Douglas's specimens came from California, but as both his and Nuttall's are the source of the description given by Hooker and Arnott it seems best to adopt as the type those specimens, Nuttall's, to which the name was first applied.

To *Cercocarpus parvifolius* are commonly referred a large variety of forms, coming from widely separated localities, and not distinguished by any varietal names (the Santa Barbara plant, usually known as variety *glabra*, alone excepted). Our plant is a shrub from 2 to 3 meters high, with rhombic-obovate leaves 30 mm. or less long, larger than in any form except the Santa Barbara plant; when young, densely silky on the veins beneath and sparingly so above; when old, thick and coriaceous, and apparently glabrous on both sides and glaucous beneath, but under a lens sparingly tomentose above and densely white-tomentose beneath; and with the tails of the achenia, when mature, 50 to 75 mm. long.

This shrub is strictly characteristic, in the region traversed by the expedition, not merely of the intramontane region of California, but of the chaparral belt of that region. It was met with first on the south slope of the San Bernardino Mountains, near Cajon Pass (No. 106), and was not seen again until we left the desert region by way of Walker Pass. After that time it was found in abundance on the western slope of the Sierra Nevada wherever we entered the chaparral belt, as on the divide between Kernville and Havilah (No. 1063), and on the divide south of Walker Basin; in the mountains south of Fort Tejon and east of Tejon Ranch; and along the eastern branch of the Kaweah River up to the yellow pine belt.

Toward the Mexican border certain forms of the species are found in the interior as far east as Texas.

Cowania mexicana Don. Trans. Linn. Soc. xiv. 575 (1825). Type locality, "in Mexico."

This shrub was supposed to have been seen in the winter on the west slope of the Charleston Mountains, and later on the east slope of the Inyos, between Keeler and Jackass Spring, associated in both places with *Kunzia glandulosa* and in the former with *Fallugia paradoxa* also, but no specimens were collected. Dr. Merriam has reported the plant in California, from the Panamint Mountains, north of Telescope Peak; in Nevada, from the Charleston, Juniper, Pahranagat, and Pahroc mountains, Mount Magruder, Gold Mountain, Hungry Hill Summit, and the Highland Range; and in Utah, from the Beaverdam Mountains, and the Santa Clara Valley, above St. George.

Fallugia paradoxa (Don) Trans. Linn. Soc. xiv. 576 (1825), under *Sieversia;* Endl. Gen. Pl. 1246 (1836–40). Type locality, "in Mexico." It is to be noted that this plant was published as *Geum cercocarpoides* by De Candolle (Prodr. ii. 554) in the same year, 1825.

This shrub was found on the Charleston Mountains, beginning with the desert juniper at 5,200 feet and extending upward in the Upper Sonoran. It was observed both on the road to Clark's sawmill (No. 300) and in Mountain Springs Pass. Dr. Merriam observed it also in the Pahranagat Mountains, Nevada, and in the Beaverdam Mountains, Utah.

Geum macrophyllum Willd. Enum. i. 557 (1809). Type locality, "in Camtschatca."

Near Whitney Meadows, Sierra Nevada (No. 1695).

Fragaria vesca L. Sp. Pl. i. 494 (1753). Type locality European.

Near Whitney Meadows (No. 1712). A strawberry occurred in several places in the upper Kern River Valley, but it was not collected in fruit and its reference to this species is based merely on the probability that it could be no other.

Potentilla breweri Wats. Proc. Amer. Acad. viii. 555 (1873). Type localities, "Mono Pass in the Sierra" and "summit above Cisco," both points in the Sierra Nevada of California.

Near Big Cottonwood Meadows, Sierra Nevada (No. 2117).

Potentilla douglasii Greene, Pittonia, i. 103 (1887). Type locality,[1] "California."

Valley of the San Joaquin River (No. 1836). Determined by Hans Siegfried.

Potentilla eremica Coville, Proc. Biol. Soc. Wash. vii. 76 (1892). Type locality as given below.

PLATE VII.

"Plant of the sub-genus *Ivesia*, perennial, in large tufts from a branched caudex, villous-canescent throughout; stems few, erect or procumbent, 10 to 20 cm. high, sparingly short-leafed; radical leaves many, the largest 13 cm. long, terete; leaflets sometimes 60 pairs, entire, broadly ovate, acute or obtuse, 2 to 2.5 mm. wide, closely imbricated in 2 rows along the rachis; stem leaves similar, shorter, borne at intervals of about 1 to 2 cm., the uppermost not exceeding 1 cm. in length; cyme narrow, about 5 cm. long; bracts simple or few-cleft, about 3 mm. long; pedicels 5 to 7 mm. long, erect; calyx 3 to 4 mm. long, lobes lanceolate-acuminate; calyx bracts ovate; stamens 20; pistils apparently 2 or 3; hairs of the receptacle dense, conspicuous, 1 to 1.2 mm. long.

"This plant was collected in winter, so that only the remains of the inflorescence of the preceding year were found. The leaves at first sight closely resemble those of *P. santolinoides*. The plant was found in but one place, about two miles east of Watkins's ranch (and about one-half mile south of the Devil Hole) in an alkaline limestone marsh on a sloping gravelly mesa, growing with *Spartina gracilis*, *Anemopsis californica*, and *Schœnus nigricans*.

"Type specimen in the United States National Herbarium, No. 366, Death Valley Expedition; collected March 2, 1891, near Watkins's ranch, Ash Meadows, Nye County, Nevada."

Potentilla glandulosa Lindl. Bot. Reg. xix. t. 1583 (1833). Type locality "California."

In the valley of the Kaweah River (Nos. 1355, 1476). The first plant collected, No. 1355, has deep-yellow petals shorter than the calyx, while No. 1476, which grew at a higher altitude, has yellowish-white petals slightly exceeding the calyx-lobes.

Potentilla glandulosa nevadensis Wats. Bot. Cal. i. 178 (1876). Type locality, "in the Sierra Nevada from the South Fork of Kern River to Oregon."

Near Mount Whitney (No. 2047).

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[1] Lindl. Bot. Reg. xxiii. under t. 1997 (1837).

Potentilla gracilis rigida (Nutt.) Journ. Acad. Phila. vii. 20 (1834), as *P. rigida;* Wats. Proc. Amer. Acad. vii. 557 (1873). Type locality, "Towards the sources of the Missouri, and as far down as the old Arikaree village."

Near Mineral King, Sierra Nevada (No. 1399).

Potentilla plattensis Nutt. in Torr. & Gr. Fl. i. 439 (1840). Type locality, "Plains of the Platte."

Farewell Gap, Sierra Nevada (No. 1750). Determined by Hans Siegfried.

Potentilla procumbens (L.) Sp. Pl. i. 284 (1753), under *Sibbaldia;* Clairv. Man. (1811). Type locality European.

Near Mineral King, Sierra Nevada (No. 1558).

Potentilla purpurascens pinetorum Coville, Proc. Biol. Soc. Wash. vii. 77 (1892). Type locality as given below.

"Plant cæspitose from a many-branched caudex; stems about 3 cm. high; inflorescence loosely cymose; radical leaves very numerous, 7 to 14 cm. long; lower leaflets about 7 mm. long, 2-divided, the divisions often 2-lobed; upper leaflets merely 2-lobed; divisions in both oblong-oblanceolate, glabrous or very scantily villous; otherwise as the type form.

"In aspect our plant is quite different from Rothrock's specimens of the type form, they being but 5 to 16 cm. high, with shorter leaves, and shorter, broader, more congested, villous-hirsute leaflets. The characters of the flowers are identical. The following references to *Potentilla purpurascens* may be helpful: Wats. Proc. Amer. Acad. xi. 148 (1876), under *Horkelia;* Greene, Pittonia, i. 105 (1887).

"Type specimen in the United States National Herbarium, No. 1579, Death Valley Expedition; collected August 10, 1891, at Trout Meadows, Sierra Nevada, Tulare County, California, by Frederick V. Coville.

"Our plant was abundant throughout the valley of the north fork of Kern River, in forests of *Pinus jeffreyi*, along the rather dry margins of meadows. Rothrock's came from a higher altitude, 9,000 feet, 'on the head-waters of Kern River,' and is undoubtedly a derivative form modified by changed conditions."

Potentilla rivalis millegrana (Engelm.) in Lehm. Add. Ind. Hort. Hamb. 11 (1849), as *P. millegrana;* Wats. Proc. Amer. Acad. viii. 553 (1873). Type locality, "in America boreali."

In the Panamint (No. 821) and Grapevine (No. 1763) mountains. The relation of this form to the true *P. rivalis* seems not to be well understood, but the customary disposal of it as a variety of that species is here followed.

Potentilla santolinoides (Gray) Proc. Amer. Acad. vi. 531 (1865), under *Ivesia;* Greene, Pittonia, i. 106. Type locality, "in the Sierra Nevada."

In the high Sierra Nevada (Nos. 1623, 2126).

Potentilla wheeleri Wats. Proc. Amer. Acad. xi. 148 (1876). Type locality, "in the southern Sierra Nevada, about the head-waters of Kern River, at 8,200 feet altitude." Rothrock states further (Bot. Wheeler Surv. 360) that the specimens came from Olaucha Peak.

Whitney Meadows (No. 1672). The petals, it should be noted, are yellow. An excellent figure of this plant is given by Rothrock (loc. cit. pl. iii.).

Rosa californica Cham. & Schlecht. Linnæa, ii. 35 (1827). Type locality, "San Francisco."

At various points both in the desert and in the mountains (Nos. 289, 828, 1720, 1766). The determination of these roses is very unsatisfactory on account of our present knowledge of the genus.

Sorbus occidentalis (Wats.) Proc. Amer. Acad. xxiii. 263 (1888), under *Pyrus;* Greene, Fl. Fran. 54 (1891). Type localities, "Mount Adams, at 5,000 to 6,000 feet altitude," "at Summit in the Sierra Nevada," "on the Big Tree road at 6,000 feet altitude," and "in Ebbett's Pass at 6,500 to 8,500 feet."

Near Mineral King, Sierra Nevada (No. 1425). This western mountain ash is a mere shrub, seldom exceeding 2 meters in height.

Heteromeles arbutifolia Ait. f. Hort. Kew. ed. 2. iii. 202 (1811), under *Crataegus;* Roem. Syn. Monogr. iii. 105 (1847). Type locality, "California."

This handsome shrub occurred on the south slope of the San Bernardino Mountains at a low altitude (No. 117), and on the south slope of the Sierra Liebre (Merriam). It is characteristic of the intramontane region.

Amelanchier alnifolia Nutt. Gen. i. 306 (1818), under *Aronia;* Nutt. Journ. Acad. Phila. vii. 22 (1834). Type locality, "in ravines and on the elevated margins of small streams from Fort Mandan to the Northern Andes," i. e. the Rocky Mountains.

Nos. 1224 and 1455 are fruiting specimens having leaves slightly pubescent on both sides (a scant pubescence remaining about the inflorescence), and villous stipules; in fact, the ordinary form of the species No. 962 is in flower. The petals are of the ordinary length of *A. alnifolia* from the Great Basin mountains, 6 mm. or less, the calyx lobes are reflexed and subulate, as in the common plant, and the form of the leaves is the same; yet our specimens are perfectly glabrous, even to calyx teeth, bracts, and stipules.

In Cottonwood Cañon, Panamint Mountains (No. 962); in Tejon Cañon (No. 1224); and on the East Fork of the Kaweah River, near Mineral King (No. 1455). An *Amelanchier*, presumably of this species, was seen in the winter at Mountain Spring in the Charleston Mountains, Nevada, in the piñon belt. Dr. Merriam reported the species also from Utah, on the eastern slope of the Beaverdam Mountains and between the upper crossing of the Santa Clara and Mountain Meadows; and from Nevada, on the North Mormon, Pahroc, and Magruder mountains.

Amelanchier pallida Greene, Fl. Fran. 53 (1891). Type locality, "dry hills of the northern and northeastern parts of the State," *i. e.* California.

Our specimens of this plant are in fruit and differ from *A. alnifolia* in the few-flowered racemes and entire, or very near the apex sometimes sparingly denticulate, cuspidate leaves. The leaves and inflorescence are sparingly pubescent, like the ordinary *A. alnifolia,* and have the same villous bracts and stipules. Only two shrubs about 2 meters high were seen, in woods of *Quercus chrysolepis* in a ravine back (south) of Fort Tejon (No. 1168), and accompanied by *Acer macrophyllum.* The leaves are strikingly different from those of *A. alnifolia.* I have examined a duplicate of Professor Greene's type specimen, collected by himself and by Dr. C. C. Parry in Siskiyou County, California, and I find the plants to be identical. The present station is about 500 miles in an air line from the original locality, and it has not yet been reported from intermediate stations.

Peraphyllum ramosissimum Nutt. in Torr. & Gr. Fl. i. 474 (1840). Type locality, "dry hill-sides near the Blue Mountains of the Oregon."

Dr. Merriam and Mr. Bailey found this shrub at Mountain Springs Pass, Charleston Mountains, on Mount Magruder, Hungry Hill Summit, the Highland Range, and the Juniper Plateau, Nevada, and at Mountain Meadow, Utah (No. 1964).

SAXIFRAGACEÆ.

Saxifraga bryophora Gray, Proc. Amer. Acad. vi. 533 (1865). Type locality, "Ebbett's Pass and on a peak near Mount Dana, alt. 9,000 feet, on wet rocks."

This delicate and beautiful alpine saxifrage is interesting as exhibiting to an unusual degree adaptation to asexual reproduction, a character frequent in boreal plants. Nearly all the flower buds except the terminal ones are transformed into rosettes of small leaves and are capable of independent growth. Some of the leaves of our specimens, although in no instance exceeding 20 mm. in length, are denticulate above. It therefore seems probable that this species may be found to intergrade with the West-American form, at least, of *S. leucanthemifolia*. Engler, in his monograph of the genus, reduces it to a variety of that species. Our specimens were collected near Mineral King, in the Sierra Nevada (No. 1562).

Saxifraga integrifolia sierræ Coville, Proc. Biol. Soc. Wash. vii. 78 (1892). Type locality as given below.

"Blades of larger leaves 8 to 12 cm. long, oblong-lanceolate to elliptical-lanceolate, acute, conspicuously serrate-denticulate, from glabrous to sparingly clammy-hairy above and beneath, thinner and more distinctly veined than in the type; petiole and margin of the leaf toward the base ciliate with clammy hairs; otherwise as the type form.

"Type specimen in the United States National Herbarium, No. 1705, Death Valley Expedition; collected August 25, 1891, about 8 miles northwest of Whitney Meadows, on the headwaters of Kern River, Sierra Nevada, Tulare County, California, by Frederick V. Coville.

"The species was described from specimens collected by Scouler 'near the mouth of the Columbia, northwest coast of America,' and is excellently figured. Specimens collected in later years in the same region agree with Hooker's description and figure in being viscid-pubescent throughout, and in having the leaves oblong, entire, obtuse, and scarcely exceeding 3.5 cm. in length. None of the specimens from the Sierra Nevada resemble the type form, but a good series of intergrades exist between the two regions and in the Rocky Mountains where the variety occurs also. The Sierran plant appears never to have been described except in the Botany of California, where the description of the type form is varied to include it. In Dr. Gray's conspectus of the species of *Saxifraga* it is not distinguished from Hooker's plant."

Saxifraga nivalis L. Sp. Pl. i. 401 (1753) Type localities, "in summis Alpibus, Spitzbergensibus, Lapponicis, Arvonicis, Virginia, Canada."

Near Mineral King, Sierra Nevada (No. 1519). Our specimens have entire or denticulate leaves, a scape about 15 cm. high, and only slightly expanded inflorescence.

Saxifraga punctata L. Sp. Pl. i. 401 (1753). Type locality, "in Siberia."

Near Whitney Meadows, Sierra Nevada (No. 1698).

Boykinia major Gray, Bot. Cal. i. 196 (1876). Type locality, "in Oregon." Gray's *B. occidentalis elata* (Proc. Amer. Acad. viii. 383) was collected by Hall in Oregon, and is taken as the type specimen of the species. Nuttall's *Saxifraga elata* proved later to be the same as Torrey and Gray's *B. occidentalis*.

Yosemite Valley (No. 1853).

Tellima bolanderi (Gray) Proc. Amer. Acad. vi. 535 (1865), under *Lithophragma;* Boland. Cat. 11 (1870). Type locality, "California, in a shady ravine, S. E. of Monte Diablo, and farther north in the Mendocino district."

Valley of Kaweah River (No. 1337). Determined by H. E. Seaton

Tellima tenella (Nutt.) in Torr. & Gr. Fl. i. 584 (1840), under *Lithophragma;* Walp. Rept. ii. 371 (1843). Type locality, "in the central range of the Rocky Mountains, on the banks of the Big Sandy and Siskadee Rivers of the Colorado of the West, about lat. 42°," in southwestern Wyoming.

In the high Sierra Nevada (Nos. 1523, 2113). It is of considerable historical interest to know that Robert Brown's authorship of this genus rests on his insertion of "Tellimam" in the following sentence in his addenda to Franklin's Narrative, p. 765 (1823): "In ordine Saxifragearum locus Heucheræ est inter Mitellam grandifloram, *Pursh*. (Tellimam) convenientem capsulæ unilocularis birostris dimidio supero flore persistente tecto, diversam staminibus decem, petalis laciniatis; et Vahliam," etc.

Mitella pentandra Hook. Bot. Mag. lvi. t. 2933 (1829). Type locality, "Rocky Mountains of North America."

This *Mitella* differs from *M. breweri* (which has round-reniform leaves, long, flexuous, brown hairs on the upper part of its petioles, and stamens opposite the calyx-lobes) in its cordate-ovate leaves, petiolar hairs, if any, straight, white, and reflexed, and stamens opposite the petals. Both are similar in their closely crenate leaf-margins, rotate calyx-tube, deltoid spreading calyx-lobes, and filiform-pinnatisect petals, similar to those of *M. nuda*, and differ in these respects from *M. trifida*, which has broadly crenate leaf-margins, turbinate calyx-tube, oblong, erect calyx-lobes, and bifid or palmately trifid, long-clawed petals. Our specimens were collected near Whitney Meadows (No. 1702).

This species appears not to have been collected in California before. It occurs from the Wasatch Mountains, Utah, and the Rocky Mountains of Colorado northward, and in the Cascade Mountains of Oregon.

Heuchera micrantha Dougl. Bot. Reg. xv. t. 1302 (1829). Type locality, "in mountainous woods, near the grand Rapids of the Columbia."

Valley of the Kaweah River (No. 1328).

Heuchera rubescens Torr. in Stansb. Rep. 388 (1852). Type locality, "Stansbury's Island, Salt Lake."

In the Sierra Nevada (Nos. 1488, 2093), and on Telescope Peak (No. 2035). The original description of this plant was given in the place above mentioned, not, as ordinarily cited, in Sitgreaves's Report.

Parnassia californica (Gray) Bot. Cal. i. 202 (1876), as *P. palustris californica*; Greene, Pittonia, ii. 102 (1890). Type locality Californian, but not definately given.

Lyon Meadow, Sierra Nevada (No. 1733). Our specimens are smaller than is usual in the Californian plant, the leaf blades not exceeding 25 mm. in length, nor the flowers 23 mm. in width; but the tapering root-leaves and the very small cauline leaf situated above the middle of the stem are the same.

Jamesia americana Torr. & Gr. Fl. i. 593 (1840). Type locality, "along the Platte or the Canadian River, near the Rocky Mountains."

In the Sierra Nevada (No. 1533), and the Panamint Mountains (No. 2015). This plant has never been reported from California until the present year.[1]

Fendlera rupicola Engelm. & Gr. in Gray, Pl. Wright. i. 77 (1852). Type locality, "on perpendicular rocks of the Guadalupe, above New Braunfels, Texas."

A shrub that probably belongs to this species, or perhaps to *Philadelphus microphyllus*, was found near Clark's sawmill, on the west slope of the Charleston Mountains, at 9,500 feet altitude, in the yellow pine belt.

Ribes aureum Pursh, Fl. 164 (1814). Type locality, "on the banks of the rivers Missouri and Columbia."

Cottonwood Cañon, Panamint Mountains (No. 961). The leaves in these specimens are unusually small, the largest being only 17 mm. long.

Ribes cereum Dougl. Trans. Hort. Soc. Lond. vii. 512 (1830). Type locality, "on dry exposed decayed granite rocks or schist, throughout the chain of the river Columbia from the Great Falls 45° 46′ 17″ N. Lat. to the source of that stream in the Rocky Mountains, 52° 07′ 09″."

On Telescope Peak (Nos. 2023, 2039), and in the high Sierra Nevada (Nos. 1391, 1521, 2056). In this species the leaves bear short-stalked glands, which later in the season deliquesce over the surface of the leaf, and which give the herbage the sweet odor of *Chamæbatia*. In addition to these glands some plants bear short hairs also on their leaves. Of our collection, the first two numbers are quite glabrous, with the exception of the glands, while the other three possess the second character mentioned above, and in addition have smaller leaves, gnarled branches, and more congested growing parts. These plants all grew in exposed places near timber-line, while the others were in lower altitudes and in shaded situations.

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[1] See Zoe, iv. 152 (1893).

Ribes lacustre molle Gray, Bot. Cal. i. 206 (1876). Type locality, "in the Sierra Nevada at 6,000 to 10,000 feet, from Mariposa Co. northward."

Near Mineral King, Sierra Nevada (No. 1423).

Ribes leptanthum Gray, Pl. Fendl. 53 (1849). Type locality, "rocky banks of the Rio del Norte, and ravines near Santa Fe," New Mexico.

In the Sierra Nevada (Nos. 1414, 1062). No. 1414 agrees with the original description in its leaves, which are glabrous or merely ciliate on the margins, and with minutely tomentose petioles. No. 1062 has both surfaces of its leaves minutely short-pubescent, the petioles as in the other. Ovaries and fruit in both are glabrous.

Ribes leptanthum brachyanthum Gray, Bot. Cal. i. 205 (1876). Type locality, "foot-hills near Carson City," Nevada.

In the Panamint Mountains (No. 746), and in Gold Mountain, Nevada (No. 2003). Our specimens are exactly like those described by Gray, with both surfaces of the leaves and the ovaries minutely glandular-hairy, and the calyx tube shorter. This plant is distinct from *R. velutinum*, described in Bulletin of the California Academy, vol. i., p. 83, and appears to be confined to the mountains of the Great Basin.

Ribes menziesii Pursh, Fl. ii. 732 (1814). Type locality, "on the north-west coast, near Fort Trinidad," Humboldt County, California.

Specimens of this gooseberry were collected near Havilah (No. 1077), and an abundance of them was seen again in the woods at Fort Tejon. In the latter place the plant was in full fruit early in July, and, following the example of the inhabitants of the region, we made an excellent jam from the berries.

Ribes oxyacanthoides saxosum (Hook.) Fl. Bor. Amer. i. 231(1834), as *R. saxosum*. Type locality, "on the undulating grounds of the interior among stones." The type specimens were collected by Douglas.

Near Whitney Meadows, Sierra Nevada (No. 1711). Petioles usually with a few long, spreading, large but rather flexuous, bristle-like hairs on the margins near the base, otherwise glabrous; leaves with a broad but well marked sinus at the base, glabrous on both sides; otherwise apparently as the type form.

Ribes oxyacanthoides was described by Linnæus from Canadian specimens. The plants from that region, as well as those from the Mississippi Valley and eastward generally, have broadly cuneate or at most truncate bases, and are sparingly tomentose on the veins about the base of the blade beneath, and on the petioles, and are usually devoid of petiolar bristles. The variety is well marked in its range, extending from the mountains of Colorado, Utah, and California northward into British America. Hooker's *R. saxosum* is, with little doubt, the plant that has been described above. It has been impracticable to compare ours with the type specimens, and there remains a bare possibility that our plant has never received a name.

Ribes sanguineum variegatum Wats. Bot. King Surv. 100 (1871). Type locality, "Washoe Mountains, near Carson City [Nevada], on stream banks."

The plant now collected differs in several respects from the type form,[1] the original specimens of which were collected on the Columbia River by Lewis. Specimens like ours, from the Rocky Mountains, were described by Rothrock in the American Naturalist, vol. viii., p. 338 (1874), as *Ribes wolfii*. No adequate series of intergrades has been seen, and it appears probable that the plant will stand as a good species. In 1855 Dr. Albert Kellogg described in the proceedings of the California Academy, vol. i, p. 63, a currant that he named "*Ribes Navadaënsis*." This is referred, in Watson's Bibliographical Index, to *R. sanguineum variegatum*, but the character, "leaves * * * pubescent above and below," given in the original description, appears to prevent that disposition of it. Dr. Kellogg did not mention the place from which his specimen came.[1] Our specimens were collected in the valley of the Kaweah River (No. 1340).

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[1] See original description, and Botany of California, vol. i., p. 207 (1876).

Ribes viscosissimum Pursh, Fl. 163 (1814). Type locality, "on the Rocky mountain in the interior of North America."

Near Mineral King, Sierra Nevada (Nos. 1384, 1496).

CRASSULACEÆ.

Cotyledon.

In the Panamint Mountains (Nos. 490, 559), and the southern Sierra Nevada (Nos. 1106, 1155). A satisfactory determination of the specimens collected cannot be made with the material at hand. Nos. 490 and 559, when last examined, more than fifteen months from the dates of collection still bore fresh leaves that had formed while the plant was drying.

Sedum radiatum Wats. Proc. Amer. Acad. xviii. 193 (1883). Type locality, " in the Coast Ranges of California; on Gavillan Peak, Monterey County," etc.

In the chaparral belt of the Sierra Nevada, in the valley of the Kaweah River (No. 1326). Although the plant has not been reported from the Sierras, our specimens are identical with those from the Coast Ranges. It was collected in mature fruit with the dried sepals, petals, and stamens still persisting almost intact. At this time most of the leaves were quite dry and scarious and showed the conspicuous veining described by Dr. Watson. Those of the basal offshoots are roughened on their margins. The carpels are horizontally divaricate or even slightly reflexed when mature. The drying of the leaves in early summer must not be taken to indicate that the plant is short-lived, for the specimens when examined more than four months after their collection were growing in their sheets.

Sedum roseum (L.) Sp. Pl. ii. 1035 (1753), under *Rhodiola;* Scop. Fl. Carn. ed. 2. i. 326 (1772). Type locality European.

Near Mineral King, Sierra Nevada (No. 1529). This is the *Sedum rhodiola* of De Candolle.

Sedum stenopetalum Pursh, Fl. i. 324 (1814). Type locality, " on rocks on the banks of Clarck's river and Kooskoosky," Idaho.

Near Mineral King (No. 1530). This plant, although common in the Rocky Mountains and extending westward to Nevada, Oregon, and Washington, seems never to have been found in California before.

HALORAGACEÆ.

Callitriche bolanderi Hegelm. Verhand. Bot. Ver. Brand. x. 116 (1868). Type locality, " bei Auburn, Sierra," California.

Near Kernville (No. 1043).

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[1] By the kindness of Mrs. Katharine Brandegee, I have been able to examine Dr. Kellogg's type specimen, which he has marked "The black currant of Placerville." The fruit has entirely disappeared, but the leaves, finely pubescent on both sides, and the recurved peduncles show that it is not *R. sanguineum variegatum*, but a form referable to the type or to the variety *glutinosum*.

Callitriche palustris L. Sp. Pl. ii. 969 (1753). Type locality European.
Near Whitney Meadows (No. 1641).

LYTHRACEÆ.

Ammania coccinea Rottb. Pl. Hort. Univ. 7 (1773).
Near Visalia (No. 1272). The true *A. latifolia* of Linnæus is now considered to be the more southern plant, without petals, but otherwise very closely resembling our northern species.

Ammania ramosior L. Sp. Pl. i. 120 (1753). Type locality, "in Virginia."
Near Visalia (No. 1252). This is the *Ammania humilis* of the Botany of California.

Lythrum album H. B. K. Nov. Gen. & Sp. vi. 193 (1823). Type locality, "prope Salamancam Mexicanorum, alt. 900 hex."

This plant has passed under the names *L. californicum* Torr. & Gr. and *L. alatum linearifolium* Gray, but both have been referred to *L. album* by Koehne.

The species was observed at the Eagle Borax Works, Death Valley; in Furnace Creek Cañon; in the south end of Resting Springs Valley; at Winters's ranch, Pahrump Valley; at Ash Meadows; and in Surprise Cañon, Panamint Mountains. The plant is characteristic of permanently wet, boggy soil, growing usually among grasses and sedges.

ONAGRACEÆ.

Epilobium adenocaulon occidentale Trelease, Rev. Epilob. 95 (1891). Type locality, "Vancouver Island and British Columbia to central California, and Nevada."
Near Mammoth, Mono County (No. 1823).

Epilobium anagallidifolium Lam. Encycl. ii. 376 (1786). Type locality, "Mont d'Or," France.
Whitney Meadows (No. 1617). The capsules in our specimens reach 45 mm. in length.

Epilobium augustifolium L. Sp. Pl. i. 347 (1753). Type locality European.
Valley of the Kaweah River (No. 1367). The American forms of this species are said not to be the same as the type of Linnæus, and for this reason Lamarck's name, *E. spicatum*, has been adopted by several writers. There seems no possibility, however, that this group of plants includes two species; but it may be found necessary to use a varietal name for our plant.[1]

Epilobium brevistylum Barbey, Bot. Cal. i. 220 (1876). Type locality, "Sierra County," California.
Near Mineral King, Sierra Nevada (No. 1439).

Epilobium glaberrimum Barbey, Bot. Cal. i. 220 (1876). Type locality, "in the Sierra Nevada; Yosemite Valley; Sierra Valley."
At low altitudes in the Sierra Nevada (Nos. 1209, 1331, 1773).

Epilobium holosericeum Trelease, Rev. Epilob. 91 (1891). Type locality, "California: San Bernardino county and Kern county."
Near Bakersfield (Nos. 1245, 1246). Determined by William Trelease.

Epilobium obcordatum Gray, Proc. Amer. Acad. vi. 532 (1865). Type locality, "in the Sierra Nevada, at Squaw Valley and Ebbett's Passes, alt. 8,000–8,500 feet." The latter locality, and probably the first also, is in Alpine County, California.

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[1] The retention of *E. angustifolium* is advocated by Edward S. Marshall in the British Journal of Botany, vol. xxix, p. 309 (1891).

Above timber-line in the Sierra Nevada (Nos. 1749, 2055). This beautiful species has been described merely as decumbent. It is really cespitose, however, forming close mats often 50 cm. in diameter, and rising only about 5 cm. above the ground.

Zauschneria californica Presl, Rel. Haenk. ii. 28 (1830). Type locality, "in California ad Monte-Rey."

Near Fort Tejon (No. 1153). This is a narrow-leafed form, intermediate between the type of the species and the variety *latifolia*.

Clarkia elegans Lindl. Bot. Reg. xix. t. 1575 (1833)—Dougl. in litt. Type locality, "in California."

In the lower altitudes of the Sierra Nevada (Nos. 1104, 1145).

Clarkia rhomboidea Dougl. in Hook. Fl. Bor. Amer. i. 214 (1834). Type locality, "from the Great Falls of the Columbia to the Rocky Mountains."

Tejon Mountains (No. 1182).

Clarkia xantiana Gray, Proc. Bost. Soc. Nat. Hist. vii. 146 (1859). Type locality, in the vicinity of Fort Tejon, California.

Dr. Gray, in the original description of this species, mentions the fact that "there are no scales at the base of the filaments; but the throat of the short funnelform tube of the calyx is evenly and densely bearded with villous hairs." These hairs closely resemble the hairy scales at the base of the filaments in *C. elegans* and *C. rhomboidea;* and the statement in the Botany of California, vol. i, p. 232, that the claw of the petal is short and broad, but not hairy or appendaged at the base, while technically correct, is apt to mislead the reader. The petals often have, below the sinus, a dark purple, light-margined spot. The species is a local one, confined, so far as known, to the southernmost Sierra Nevada (Nos. 1060, 1151) and the contiguous portions of the Coast Ranges. Both our stations were in the scant shrubbery along the lower edge of the chaparral. The soil was a hard, dry clay, supporting considerable annual vegetation. The flowers are remarkably delicate and beautiful.

Gayophytum eriospermum sp. nov.

Plant 30 to 50 cm. high, widely branched; stem glabrous; leaves narrowly linear, acute at apex, attenuate at base, the largest 5 cm. long and 3.5 mm. broad; pedicels 5 to 10 mm. long, erect; ovary appressed-pubescent; calyx lobes 4 mm. long, sparingly appressed-hairy; petals 5 to 6 mm. long, obovate, rose-colored in age, probably white when first expanded; capsule erect, about 1 cm. long, torulose, commonly 8- to 10-seeded; seed 2 mm. long, narrowly obovate, densely pubescent.

Type specimen in the United States National Herbarium, No. 1316, Death Valley Expedition; collected July 28, 1891, along the road at Big Tree Cañon, on the East Fork of Kaweah River, Tulare County, California, by Frederick V. Coville.

This plant differs from all the described species except *G. lasiospermum* in its hairy seeds, and from that in its much larger flowers and the longer, denser pubescence of the seeds. In general appearance it most nearly resembles *G. diffusum.*

Gayophytum lasiospermum Greene, Pittonia, ii. 164 (1891). Type locality, "near Julian, San Diego Co., California."

Near Kernville (No. 1040), and near Fort Tejon (No. 1180).

Gayophytum ramosissimum Torr. & Gr. Fl. i. 513 (1840). Type locality, "Rocky Mountains, etc."

Black Cañon, White Mountains (No. 1797). Determined by E. L. Greene.

Œnothera alyssoides Hook. & Arn. Bot. Beech. 340 (1840–41). Type locality, "Pine Creek, Snake Country," southwestern Wyoming.

Near Keeler (No. 859).

Œnothera bistorta Nutt. in Torr. & Gr. Fl. i. 508 (1840). Type locality, "St. Diego, California."

Near San Bernardino (No. 31).

Œnothera brevipes Gray, Pac. R. Rep. iv. 87 (1856). Type locality, "gravelly hills on and near the Colorado," in Arizona or southern California.

This species has, typically, villous pubescence and lyrate-pinnatifid leaves. Toward the base of the stems, however, there is always some puberulence, among the long hairs on the lower part of the stem, and the villous pubescence is frequently wanting. The lateral lobes of the leaves are frequently very few and sometimes entirely wanting. These changes from simple to lyrately-pinnatifid leaves, and from a densely villous to puberulent (or above glabrous) surface, together with a variation in size from a very few to 60 cm., give the species a wide range in general appearance; but the bright yellow petals 1 to 2 cm. long distinguish it from *Œ. scapoidea.*

It is a common plant of the desert and was recorded in the southern part of the Funeral Mountains (No. 253); in Furnace Creek Cañon (Nos. 359, 438); between Bennett Wells and the mouth of Johnson Cañon (No. 482); near Hot Springs, Panamint Valley (No. 666); near Keeler; and on the road from Keeler to Darwin.

Œnothera cæspitosa Nutt. Gen. i. 246 (1818). Type locality, "on denudated and arid argillaceous hills on the banks of the Missouri, from White river to the Mandans, and in all probability to the commencement of the [Rocky] mountains."

In our plant the sepals and leaves are short-villous, the latter especially so on the margins; and the valves of the capsule are but lightly 2-keeled. It was seen in Johnson (Nos. 535, 2081), Willow Creek, and Mill Creek cañons, Panamint Mountains; and between Keeler and Crystal Spring.

Œnothera californica Wats. Proc. Amer. Acad. viii. 582 (1873), as *Œ. albicaulis californica;* Wats. Bot. Cal. i. 223 (1876). Type locality, "California."

The long hairs in No. 1012 are so very dense that the whole herbage appears white. Specimens were collected near Lone Pine (Nos. 952, 1777), near Indian Wells (No. 1012), and in the western end of Antelope Valley. All these places, although in the desert region, are near its margin.

Œnothera cardiophylla Torr. Pac. R. Rep. v. 360 (1856). Type locality, "near Fort Yuma."

All these specimens are more scantily hairy than the type, and the hairs are inclined to be gland-tipped. The capsules are usually sessile. The species is commonly considered an annual, but in these regions the plant has a suffrutescent base living through at least one winter. It occurred in a cañon of the Funeral Mountains, opposite Bennett Wells (No. 208), and in Surprise Cañon, Panamint Mountains (Nos. 624, 725).

Œnothera contorta Lehm. in Hook. Fl. Bor. Amer. i. 214 (1834)—Dougl. MS. Type locality, "sandy barren soil, on the interior banks of the Columbia River."

Near Crystal Spring, Coso Mountains (No. 938), and near Havilah (No. 1082), in the southern Sierra Nevada. The petals in some of these plants are 4 mm. long. The name given above is an older one, as noted by Dr. Watson,[1] for *Œ. strigulosa.* As they are considered synonymous by the same author,[2] the older name is here used.

Œnothera contorta pubens (Wats.) Proc. Amer. Acad. viii. 594 (1873), as *Œ. strigulosa pubens.* Type locality not given; range, "from Washington Territory to southern California, and through northern Nevada to the Wahsatch."

Mill Creek Cañon, Panamint Mountains (No. 762).

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[1] Proc. Amer. Acad. viii. 594 (1873).

[2] Bibliographical Index, 386 (1878).

Œnothera dentata Cav. Ic. Pl. iv. 67 (1797). Type localty, "Coqiuimbo & Talcaguano, Chili."

In the same locality as the last (No. 759). The petals in this species reach 13 mm. in length.

Œnothera gauræflora Torr. & Gr. Fl. i. 510 (1840). Type locality, "California."

In Johnson (No. 553), Surprise (No. 613), and Cottonwood (No. 968) cañons, Panamint Mountains. If the *Gaura decorticans* of Hooker and Arnott be really the same plant as this, that specific name should be retained.

Œnothera grandiflora Ait. Hort. Kew. ii. 2 (1789). Type locality, "North America."

Yosemite Valley (No. 1850).

Œnothera hartwegi lavandulæfolia (Torr. & Gr.) Fl. i. 501 (1840), as *Œ. lavandulæfolia;* Wats. Proc. Amer. Acad. viii. 590 (1873). Type locality, "Plains of the Platte."

In the Mormon Mountains, Utah (No. 1984).

Œnothera micrantha Hornem. loc. indet., non Hort. Havn.

Near Havilah (No. 1078).

Œnothera refracta Wats. Proc. Amer. Acad. xvii. 373 (1882). Type locality, "Southern California to Southern Utah."

The petals are white or pale rose-colored, not yellow, as originally described. The species occurred in the mountains east of Resting Springs (No. 342); in Vegas Wash (No. 415); in Furnace Creek Cañon (No. 463), and about the mouth of Hall Cañon, Panamint Mountains (No. 662).

Œnothera scapoidea Torr. & Gr. Fl. i. 506 (1840). Type locality, "clay hills in the Rocky Mountains."

At several points in the Lower Sonoran zone of the desert (Nos. 447, 461, 663, 861). Nos. 663 and 861 do not belong to the typical form of the species.

Œnothera scapoidea purpurascens Wats. Proc. Amer. Acad. viii. 595 (1873). Type locality, "on the eastern side of the Sierra from Oregon to Mono Lake."

When the desert *Œnotheræ* shall have been carefully studied in the field and with full material, this plant will undoubtedly prove quite distinct from *Œ. scapoidea.* It was common in the desert region, from the lowest to the highest altitudes of the Lower Sonoran zone. The following localities were recorded: Long Valley (No. 190); Vegas Wash (No. 405); Furnace Creek Ranch (No. 471); Furnace Creek Cañon (No. 571); near Hot Springs, Panamint Valley (No. 664); Mill Creek and Willow Creek (No. 771) cañons, Panamint Mountains; Keeler; the eastern slope of Walker Pass; and the western side of the Ralston Desert (No. 1997).

Œnothera trichocalyx Nutt. in Torr. & Gr. Fl. i. 494 (1840). Type locality, "plains of the Platte in the Rocky Mountains."

Near Willow Creek, Panamint Mountains (No. 753).

Œnothera xylocarpa sp. nov. PLATE VIII.

Plant of the subgenus *Euœnothera*, biennial or perennial, acaulescent, with a thick, vertical root; leaves prostrate or ascendant, on petioles a little longer than the blades; blade pinnately parted, the terminal lobe much the largest, ovate, usually cordate, irregularly undulate-denticulate, acute or obtuse, puberulent; lateral lobes oblong, irregular in size, larger ones 2 to 6, smaller ones of about the same number, sometimes all of them wanting; ovary sessile, pubescent, and somewhat hirsute; calyx tube slender, short-hirsute, 2.5 to 4 cm. long; calyx lobes 1.5 to 2 cm. long, hairy like the tube, their apices united in the bud; petals yellow, cuneate-obcordate, about 2.5 cm. long; filaments about three-fourths as long as the petals; anthers 8 to 10 mm. long; style nearly as long as the petals; stigmas 3 to 4 mm. long; capsule woody, when fully developed 6 cm. long, tapering from a base 10 or 12 mm. in diameter to a slender apex, narrowly winged below at the junction of the valves, each valve with a thick, prominent rib down its back; seed 2 to 2.5 mm. long, narrowly obovate, truncate at the chalaza, tuberculate, with a broad, flat, smooth raphe.

Type specimen in the United States National Herbarium, No. 1627, Death Valley Expedition; collected August 19, 1891, on the west side of Whitney Meadows, Sierra Nevada, Tulare County, California, by B. H. Dutcher.

The plants grew in the well-drained granitic soil that surrounds the meadows.

Godetia bottæ Spach. Monogr. Onagr. 73 (1835). Type locality, "in California australiori."

In the southern Sierra Nevada (Nos. 1099, 1150). Determined by E. L. Greene. The specimens of No. 1150 are insufficient for positive identification.

Godetia purpurea (Curtis) Bot. Mag. x. t. 352 (1796), under *Œnothera;* Wats. Bot. Cal. i. 229 (1876). Type locality, "the western coast of North-America."

Tejon Cañon, Sierra Nevada (No. 1216).

Godetia williamsoni Dur. & Hilg. Pac. R. Rep. v. pt. iii. 7 (1855). Type locality, "Fort Miller," now Millerton, Fresno County, California.

In the southern Sierra Nevada (Nos. 1071, 1217). Determined by E. L. Greene. The specimens of No. 1071 are very small, most of them less than 10 cm. high.

Boisduvalia stricta (Gray) Proc. Amer. Acad. vii. 340 (1868), under *Gayophytum;* Greene, Fl. Fran. 225 (1891). Type locality. "dry hills, Cloverdale, Sonoma Co.," California.

Near Kernville (No. 1041). This is the *B. torreyi* of Watson, and has been supposed to grow only in the coast regions of Oregon and California. Its occurrence in the valley of Kern River is unexpected.

Heterogaura heterandra (Torr.) Pac. R. Rep. iv. 87 (1857), under *Gaura*. Type locality, "river banks, Mokelumne Hill, California."

Near Fort Tejon (Nos. 1170, 1181). In the Proceedings of the American Academy, vol. vi, p. 354 (1866), this plant was separated from the genus *Gaura*, and called *Heterogaura californica,* a name under which it has since passed.

Circæa pacifica Asch. & Magn. Bot. Zeit. xxix. 392 (1871). Type locality, "aus der Gegend von San Francisco."

Valley of the Kaweah River (No. 1369).

LOASACEÆ.

Petalonyx nitidus Wats. Amer. Nat. vii. 300 (1873). Type locality, "southern Nevada."

This species is distinguished from *P. thurberi* by its petiolate (petioles 2 to 4 mm. long) usually shining leaves, which are not uniformly reduced on the branches, and the form of its inflorescence, paniculate and terminating the branches. From the herbarium specimens that I have seen, and from my field observations, the species appear distinct. *P. nitidus* was observed on the divide between Ash Meadows and Pahrump; on the western foot-slope of the Charleston Mountains, along the road from Winters's ranch to Clark's sawmill; in Big Horn Cañon, Grapevine Mountains, Nevada (No. 980); in Johnson and Surprise cañons, Panamint Mountains; between Keeler and Crystal Spring; between Lone Pine and Olancha; and at the eastern base of the Sierra Nevada, near Indian Wells.

Petalonyx parryi Gray, Proc. Amer. Acad. x. 72 (1874). Type locality, "St. George, Southern Utah."

This interesting species was well characterized by Dr. Gray, but it was afterwards referred[1] to *Petalonyx nitidus* of Watson. It is conspicuously different from that species, however, in its crenate leaves, its really shrubby character, and its simple racemose inflorescence. *P. nitidus* is merely suffrutescent and has sinuate-dentate leaves, and paniculate inflorescence. Several other less conspicuous but crucial characters distinguish the two species. Dr. Parry collected the plant near St. George, Utah, "within a stone's throw of the great Mormon temple,"[2] and, although he searched the locality carefully, found but a single shrub. It has not been reported since. From our specimens and Dr. Parry's, the following diagnostic description is drawn: a shrub 0.8 to 1.5 meters high; branches of the year short, not exceeding 10 cm.; leaves ovate, sessile, crenate, bluntly acute, rounded or broadly cuneate at the base, 1.5 to 2.5 cm. long, the lower becoming small, oblong, narrowly cuneate, obtuse, and entire; inflorescence a usually simple, spike-like, dense raceme; bracts ovate, denticulate, long-acuminate; ovary 2 mm. long; calyx lobes filiform-linear, about twice as long as the ovary; corolla 10 mm., its tube about 6 mm., in length.

Our specimens were collected in the Vegas Wash, Nevada (No. 1901), about 150 kilometers from the type locality.

Petalonyx thurberi Gray, Pl. Thurb. 319 (1854). Type locality, "valley of the Rio Gila."

This plant varies widely in its leaves, some of them being entire, others irregularly dentate. On a single plant they are usually, however, uniform. The stems are inclined to live over the winter, and often some growth is made during these months. From these causes the plant presents a great variety of forms. It is distinguished from *P. nitidus* by its sessile leaves, those of the branches being always small and uniform, and by its inflorescence of simple, spikelike, in fruit usually elongated, racemes terminating the branches. It was seen between Stoddard Wells and Daggett (No. 135); in the south end of the Funeral Mountains, near Saratoga Springs (No. 249); in the sandhills west of Watkin's ranch, Ash Meadows; and in Furnace Creek Cañon (No. 356).

Mentzelia albicaulis (Hook.) Fl. Bor. Amer. i. 222 (1834), under *Bartonia*—Dougl. MS.; Torr. & Gr. Fl. i. 534 (1840)—Dougl. MS. Type locality, "arid sandy plains of the river Columbia, under the shade of *Purshia tridentata*."

These plants vary slightly in the length of calyx-lobes and petals, and considerably in the toothing of their upper leaves, but they appear to intergrade and not to be in any case geographical variations. Nos. 523 and 748 may be *M. gracilenta*. Specimens were observed in the southern part of the Funeral Mountains, near Saratoga Springs (No. 252), and in a cañon west of Amargosa; at Resting Springs and the mountains east of them (No. 341); in Furnace Creek Cañon (No. 351); in the Vegas Wash (No. 410); between Ash Meadows and Furnace Creek (No. 441); in Johnson (No. 523), Surprise, Hall, Willow Creek (No. 748), and Mill Creek cañons, Panamint Mountains; and near Crystal Spring, Coso Mountains (No. 937).

Mentzelia congesta Nutt. in Torr. & Gr. Fl. i. 534 (1840). Type locality, "Rocky Mountains, on Lewis River."

Near Cystal Spring, Coso Mountains (Nos. 911, 933). This species, although collected heretofore in widely separated localities, appears to be rare, and was seen in but one locality by the expedition. It is distinguished from other species by its large bracts which in No. 933 (the more nearly typical specimen) are white-membranaceous and green-margined, and in No. 911 membranaceous only at the base, ar ain
the flowers congested in glomerules terminating the branches. The leaves c
are nearly entire, those of No. 911 pinnately lobed. No. 911 is referred b on Moun-
fully and may be a very large specimen of *M. albicaulis*. It grew in rich prings Pass;
ast of Panaca

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[1] Wats. Index, 391 (1878).

[2] Amer. Nat. ix. 144 (1

Mentzelia dispersa Wats. Proc. Amer. Acad. xi. 137 (1876). Type locality,[1] "East Humboldt Mountains, Nevada, and Antelope Island and the Wahsatch, Utah; 4,500–6,000 feet altitude."

Near Havilah (No. 1086).

Mentzelia lævicaulis (Hook.) Fl. Bor. Amer. i. 221 (1834), under *Bartonia*—Dougl. MS.; Torr. & Gr. Fl. i. 535 (1840). Type locality, "on the gravelly islands and rocky shores of the Columbia, near the '*Great Falls.*'"

Near Independence (No. 956).

Mentzelia reflexa Coville, Proc. Biol. Soc. Wash. vii. 74 (1892). Type locality as given below. PLATE IX.

"Plant annual, 20 cm. or less high; stem stout, diffusely branching from the base, brownish white and striate when dry, hirsute, as well as the leaves and calyx lobes, with retrorsely barbed, as well as with upwardly denticulate, hairs; leaves from linear-oblanceolate below to ovate or even hastate above, short-petioled or sessile, all irregularly sinuate-dentate or the lowest almost pinnatifid; flowers single on short, usually 1- or 2-leaved axes in the forks of the stem; ovary broadly oblong, 4 to 5 mm. long, hirsute; calyx lobes triangular-subulate, about 1.5 mm. broad at base, by 5 to 6 mm. long; petals oblong-oblanceolate, tapering to a bluntly acute apex, equaling the calyx lobes; staminodia none; stamens 9 to 13, shorter than the calyx; filaments expanded at base only, or almost to the apex, to a width of about 0.5 mm.; anthers small, about as broad as long; placentæ 3, broad, fleshy; ovules about one-half imbedded in the placentæ; style cleft for about one-third its length, equaling the stamens; capsule oblong, 8 to 10 mm. long, its pedicel reflexed at the apex; seeds about 10 or 12 in each capsule, gray, somewhat compressed, angularly obovate or pyriform, slightly constricted below the middle, and with a deep, transverse groove on either face along this line, muriculate throughout.

"This plant appears not to be closely related to any known species of *Mentzelia*. It resembles in its petals, stamens, and seeds *M. torreyi*, and in the last of these organs *M. tricuspis* and its allies. Its characteristic external features are its diffusely branched but stiff habit, its flowers scattered in the forks of the stem, and its reflexed fruiting pedicels. Its seeds resemble those of *M. tricuspis*.

"Type specimen in the United States National Herbarium, No. 709, Death Valley Expedition; collected April 21, 1891, in Surprise Cañon, Panamint Mountains, California, by Frederick V. Coville and Frederick Funston."

This plant was also observed in Furnace Creek Cañon (No. 454), and near the mouth of Hall Cañon, Panamint Mountains (No. 688).

Mentzelia torreyi Gray, Proc. Amer. Acad. x. 72 (1874). Type locality, "sterile saline plains of Humboldt County, Nevada."

A few plants of a perennial *Mentzelia* were seen early in March in the saline mesa near the Devil Hole, about 2 miles east of Watkins's ranch, Nye County, Nevada. Their stems were in their winter condition, dead and brown, and no specimens were collected. They may belong to *M. torreyi*, a species that has been but once collected, in a similar location in Humboldt County, Nevada. Our plant was 30 to 50 cm. high, while *M. torreyi* is described as but 3 to 6 inches in height.

Mentzelia tricuspis Gray, Amer. Nat. ix. 271 (1875). Type locality, "from the desert districts south of St. George," Utah.

On In the Vegas Wash and in the valley of the Virgin River, below St. Thomas
ranch 1892, 1908). This species is distinguished from *M. involucrata* of Watson[2] by its
980); in filiform, pinnatifid, herbaceous bracts, and capitate stigmas. *M. involucrata*
Crystal Spri y ovate, linear-toothed, and in the center membranaceous bracts, and
Sierra Nevad -mas not expanded at the tip. It was collected first by the Ives Expe-

Petalonyx p.

George, Southern t. King Surv. 114 (1871). [2] Proc. Amer. Acad. xx. 367 (1885).

dition at RiversideMountain, on the Colorado River, in the northeastern corner of San Diego County, California, January 25, 1858, and was called in that report *M. lævicaulis*. These two species, together with *M. hirsutissima* of Watson,[1] which came from Angels Island, Gulf of California, form a group easily recognized by all their filaments, except the innermost, being broadly expanded above and continued at each side, from a few millimeters below the anther, into a slender prolongation.

Eucnide urens (Gray) Proc. Amer. Acad. x. 71 (1874), under *Mentzelia*—Parry in herb.; Parry, Amer. Nat. ix. 144 (1875). Type locality, "rocky ravines of the Colorado near the confluence of Williams River," and "near St. George, Southern Utah."

This plant was first seen in a small ravine west of Lone Willow Tanks, and afterward at many points, as follows: on the south slope of Browns Peak; on Lone Willow Peak; in Long Valley; in a cañon of the Funeral Mountains, opposite Bennett Wells; in Furnace Creek Cañon; near Saratoga Springs; at Resting Springs; in the cañon of Mesquite Spring, Funeral Mountains; in Furnace Creek Cañon; between Ash Meadows and Pahrump; in Vegas Valley, Nevada; in Johnson, Surprise, and Hall cañons, Panamint Mountains; in a cañon of the Inyo Mountains, near Swansea; and on a cliff at Rose Spring, Owens Valley (No. 1005). The species is a characteristic cañon plant, never growing on the open mesa, and never above the Lower Sonoran zone. It is a suffrutescent perennial, with large, handsome, pale yellow flowers, and covered with prickly barbellate hairs. Hitherto it has been considered rare west of the Colorado River, but in the northern Mohave Desert region it is common.

CUCURBITACEÆ.

Cucurbita fœtidissima H. B. K. Nov. Gen. & Sp. ii. 123 (1817). Type locality, "prope Guanaxuato Mexicanorum, altit. 1080 hexap."

This plant, the *Cucurbita perennis* of most American authors, was found in the San Bernardino Valley.

Cucurbita palmata Wats. Proc. Amer. Acad. xi. 137 (1876). Type locality, "San Diego County [California]: collected in Cajon Valley, and at Larken's Station near the Jacumba Mountains."

In Furnace Creek Cañon (No. 360), and near Indian Wells (No. 1011).

Micrampelis macrocarpa Greene, Bull. Cal. Acad. i. 188 (1885), under *Echinocystis;* Greene, Pittonia, ii. 129 (1890). Type locality not given; range, "from perhaps Santa Barbara [California], or a little farther northward, down the peninsula as far, at least, as Cedros Island."

In the Cañada de las Uvas (No. 1213).

DATISCACEÆ.

Datisca glomerata (Presl) Rel. Haenk. ii. 88 (1835), under *Tricerastes;* Brew. & Wats. Bot. Cal. i. 242 (1876). Type locality, "in parte occidentali Mexici et in California ad Monte-Rey."

Valley of the Kaweah River (No. 1336).

CACTACEÆ.

Mamillaria deserti Engelm. Bot. Cal. ii. 449 (1880). Type locality, "at Ivanpah, 30 [about 140!] miles northeast of San Bernardino, in one of the mountain ranges stretching into the desert."

This little-known cactus was seen on the western slope of the Charleston Mountains, on the roads both to Clark's sawmill (No. 320) and to Mountain Springs Pass; on the eastern slope of the same pass (Nos. 382, 383); and 30 kilometers east of Panaca

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[1] Proc. Amer. Acad. xii. 252 (1877).

(No. 1982). All these localities are in Nevada. The first two stations are in the upper part of the *Larrea* belt, the third a little above it. Mr. Bailey collected specimens also in Reese River Valley, central Nevada (No. 160), the most northerly locality known for the species. Our speimens indicate that this species is probably identical with *M. chlorantha* Engelm.

Mamillaria tetrancistra Engelm. Amer. Journ. Sci. ser. 2. xiv. 337 (1852). Type locality, "from San Diego to the junction of the Gila with the Colorado," California.

The name given above, which was originally applied to this species, was found later by Engelmann not to be accurately descriptive, and he therefore changed it to *M. phellosperma*,[1] with the remark: "The name originally given had to be altered, because very rarely, if ever, are 4 hooked spines seen." By this latter name it has usually been known. The species were seen in Johnson (No. 497) and Surprise (Nos. 609, 631) cañons, Panamint Mountains; and in the Vegas Wash, Nevada (No. 428).

Echinocactus johnsoni Engelm. Bot. King Surv. 117 (1871)—Parry MS. Type locality, "about St. George in Southern Utah."

This small and handsome *Echinocactus* was found in the mountains east of Resting Springs (No. 278), a point within the limits of California; in the Vegas Wash, Nevada (No. 1895); and in the Beaverdam Mountains, Utah (No. 1940). The largest specimen collected measures 11.5 cm. broad by 20 cm. high.

Echinocactus polyancistrus Engelm. & Bigel. Pac. R. Rep. iv. 29 (1856).

Type locality, "on gravelly hills and sandy plains at the head waters of the Mojave, on the eastern slope of the California Cordilleras, one day's journey before reaching the Cajon Pass."

This is one of the rarer cactuses found by the expedition. It was first seen about 26 kilometers north of Daggett (No. 167), and afterwards at Copper City Spring (No. 168), and on the southern part of the Inyo Mountains (No. 880). Specimens were collected in Fish Lake Valley by Mr. Bailey (No. 2010). At no point was the species abundant, only a few plants occurring scattered over a large area of the dry, gravelly mesa. The species is a very pretty one. The large magenta-colored flowers and the long spines, some colored gray and some brown, the longest of them curved, all set upon a short, nearly spherical stem, give the plant a striking appearance.

Echinocactus polycephalus Engelm. & Bigel. Pac. R. Rep. iv. 31 (1856). Type locality, "stony and gravelly hills and dry beds of torrents from 20 miles west of the Rio Colorado to about 150 miles westward up the Mojave."

The first specimens of this cactus were seen on the north side of the Mohave River at Victor (No. 153), growing with *Cereus engelmanni*. From this point to Lone Willow Spring the plant occurred frequently. It grew also in the Panamint Mountains, and in all the ranges east of them to the bend of the Colorado River. Westward it was seen only near Crystal Spring, Coso Mountains, and in the Inyo Mountains, near Keeler. It rarely occurred below an altitude of 2,000 feet, and its favorite habitat was dry, exposed, rocky slopes. It seldom occurred on an open mesa and never above the Lower Sonoran zone. Dr. Merriam found it also in Indian Spring Valley, Desert Mountains, Kingston Range, Pahranagat Valley, Muddy Mountains, and in the valleys of the Virgin and Muddy rivers.

Echinocactus wislizeni lecontei (Engelm. & Bigel.) Pac. R. Rep. iv. 29 (1856), as *E. lecontei*; Engelm. in Rothr. Bot. Wheeler Surv. 128 (1878). Type locality, "on the lower Gila." "Subsequently Dr. Bigelow met with this remarkable plant, abundantly, from the Cactus Pass, at the head waters of Williams' river [Arizona], down this stream to the Colorado, and west of it till *E. Polycephalus* took its place."

This species of so-called "barrel cactus" was long considered distinct from *E. wislizeni*, but Dr. Engelmann finally regarded it as a variety only. It ranges from western Arizona and southwestern Utah westward across southern Nevada into the eastern borders of southern California, and southward into the State of Sonora, Mexico. *E. wislizeni* is known only from extreme western Texas, southwestern New Mexico, and northern Chihuahua. It is of the western plant that Bigelow wrote:[1] "One of the first of them [cactuses] that we found after entering this valley [Santa Maria Valley, in northwestern Arizona] was the *Echinocactus Wislizeni* of Dr. Engelmann, called by the Mexicans 'visnada,' the juice of which is said to serve as a substitute for water when it can not otherwise be procured." The same plant is undoubtedly meant by Fremont, who, traveling from the west, saw first near the "archilette," in what is known in this report as Resting Springs Valley, a cactus of which he wrote:[2] "Fuentes pointed out one [cactus] called by the Spaniards *bisnada*, which has a juicy pulp, slightly acid, and is eaten by the traveler to allay thirst." The species was seen on the eastern slope of the Charleston Mountains, Nevada; on the rocks east of Cottonwood Springs, Vegas Valley, Nevada; on the mountains east of Resting Springs (No. 277); and in Surprise Cañon, Panamint Mountains, California (No. 717). Dr. Merriam reported it on the western slope of the Beaverdam Mountains, Utah, and on the mesa between the valleys of the Virgin and Muddy, Nevada.

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[1] Proc. Amer. Acad. iii. 262 (1857).

Cereus engelmanni Parry in Engelm. Amer. Journ. Sci. ser. 2. xiv. 338 (1852). Type locality, "mountains about San Felipe, on the eastern declivity of the Cordilleras," California.

This species varies much in general appearance by reason of the difference in color and length of the spines, which range from reddish-brown to grayish-white and straw-color. The plants from higher elevations have usually grayish spines; and, sometimes, as in No. 881, only 2 central spines. Dr. Engelmann has distinguished two varieties, *variegatus* and *chrysocentrus*, the latter of which is attributed to the Mohave Desert region.

The first plants were seen on the rocky hillside north of the Mohave River at Victor (No. 154). From this point to Daggett the plant occurred occasionally in a similar habitat. One specimen, a few miles southwest of Daggett, consisted of a group of 32 well-formed stems, besides several smaller ones. It occurred again on Lone Willow Peak (No. 187); in the southern part of the Funeral Mountains, near Saratoga Springs and at Mesquite Spring; in the northern end of Resting Springs Valley; in the mountains between Ash Meadows and Pahrump; on both the eastern and western (No. 380) foot-slopes of the Charleston Mountains; at St. George, Utah (No. 1955); in Johnson, Surprise, and Willow Creek cañons, Panamint Mountains; and near Swansea, in a cañon of the Inyo Mountains (No. 881). Dr. Merriam and Mr. Bailey reported it also from Deep Spring Valley, California, from Pahranagat Valley, and Gold, Timpahute, Pahranagat, Desert, Juniper, and Muddy mountains, Nevada; and from the Beaverdam Mountains and Santa Clara Valley, Utah. The plant selsel occurs in the bottom of a valley, but usually in rocky soil or upon a very stony mesa. In Johnson Cañon was found a specimen, one of whose stems was elongated to 43 cm. It had 13 ribs, and its longest spine was 4.4 cm. long.

Cereus mojavensis Engelm. & Bigel. Pac. R. Rep. iv. 33 (1856). Type locality, "between the Rio Colorado and Mojave Creek," California.

The type specimens lacked both flowers and fruit, of which a description is here appended; flowers 5 to 7 cm. long, tubular-campanulate; ovary and calyx-tube green, about one-half the length of the flower, provided with about 20 to 30 reddish-green ovate to oblong, obtuse scales, these (the lower about 1 mm. the upper sometimes 7 mm. long) bearing in the axils a tuft of short, woolly hairs, and about 6 to 8 ascending, white or pale brown spines usually 1 cm. or less long; cavity of the ovary about 1 cm. high; tube of the calyx smooth inside for a distance of about 8 mm.; petals cuneate-oblanceolate, obtuse, or truncate, or undulate at the apex, of a deep, rich, crimson color; stamens nearly equaling the petals, their anthers, when dry at least, magenta-colored; stigmas about 10, green; fruit (collected by Parish Brothers) oblong, 2.5 to 3 cm. long, the lower half devoid of spines and wool; seed black, about 2 mm. long, obliquely obovoid, slightly compressed, pitted, the pits somewhat confluent in longitudinal rows. This species, characteristic of the mountains of the Mohave Desert region, is closely related to *C. phœniceus*, which ranges from western Texas to Colorado and Arizona, but it is distinguished from the latter species by at least its longer curved spines. Their flowers and fruit have not been compared in a sufficiently critical manner to determine the real relation of the two plants.

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[1] Pac. R. Rep. iv. 12.

[2] Frem. Second Rep. 264 (1845).

This species is remarkable for the color of its rich red flowers, the most beautiful of any cactus with which we met, and for the size of its cespitose clusters of stems. It was found but sparingly, first in the Charleston Mountains, below Clark's sawmill (No. 321), again in the same range on the eastern slope of Mountain Springs Pass, and lastly in the Panamint Mountains, both in Johnson Cañon, in Surprise Cañon (No. 632), and on the divide between them. Dr. Merriam found this species in the White Mountains of California, the Pahranagat, Juniper, and Highland mountains of Nevada, and in the Santa Clara Valley of Utah. The smaller plant bore sometimes no more than 10 or 12 stems, but plants with 100 stems are frequent, one growing in the Charleston Mountains having by actual count 128. On the north side of Panamint Pass is a high granitic butte, to the northeast of which, about 400 meters lower, is a darker butte composed of shaly rock. Down the southeast side of the latter butte is a steep ridge covered with broken stones, in which grew a very large specimen of this plant. It had the form of a dense oblong mat with the center elevated about 20 cm. The greatest diameter of the mass was 99 cm., the shortest 74 cm., and the number of the unusually small and closely packed stems was estimated to be about 600.

The species is characteristic of the belt of *Pinus monophylla.*

Opuntia acanthocarpa Engelm. & Bigel. Pac. R. Rep. iv. 51 (1856). Type locality, "on the mountains of Cactus Pass, about 500 miles west of Santa Fé," New Mexico.

On the eastern slope of the Charleston Mountains, Nevada (No. 384); from the valley of the Virgin, at a point near Bunkerville, Nevada, to the Beaverdam Mountains, Utah (No. 1943); and in the lower Santa Clara Valley, Utah (Merriam).

Opuntia angustata Engelm. & Bigel. Pac. R. Rep. iv. 39 (1856). Type locality, "from the foot of the Inscription rock, near Zuñi, to Williams' river, and westward as far as the Cajon Pass of the California mountains."

In Johnson Cañon, Panamint Mountains (No. 544).

Opuntia basilaris Engelm. & Bigel. Pac. R. Rep. iv. 43 (1856). Type locality, "on hills and in ravines from the Cactus Pass down the valley of Williams' river to the Colorado, and to Mojave creek."

This is the only flat-stemmed *Opuntia* of the *Larrea* belt in the Mohave Desert. It was found sparingly from Hesperia (Nos. 51, 138) to Death Valley, and afterward more abundantly in the region eastward as far as the expedition went. Westward it extended not only to the limit of the desert vegetation, but in some cases beyond it; for example, it occurred along the South Fork of Kern River, in the valley of Caliente Creek, and in the southern part of the Tulare Plains, in the vicinity of Tejon Ranch. White-flowered specimens were collected between Keeler and Darwin (No. 914). Dr. Merriam found this *Opuntia* also in Deep Spring Valley, California; in Fish Lake Valley, Grapevine Cañon, Timpahute Mountains, Muddy Mountains, and valleys of the Virgin and Muddy rivers, Nevada; and in the Beaverdam Mountains, Utah.

Opuntia bernardina Parish, Bull. Torr. Club, xix. 92 (1892)—Engelm. in herb. Type locality, "dry hills and mesas from the Coast Range to the San Bernardino Mts., in the San Jacinto and San Bernardino Valleys."

The common cylindrical-stemmed *Opuntia* of the San Bernardino Valley (No. 29).

Opuntia chlorotica Engelm. & Bigel. Pac. R. Rep. iv. 38 (1856). Type locality, "on both sides of the Colorado, from the San Francisco mountains to the headwaters [of] Williams' river, sometimes called 'Bill Williams' fork,' and to the Mojave creek."

In the Charleston Mountains, Nevada, both near Clark's sawmill (No. 313) and on the eastern slope of Mountain Springs Pass.

Opuntia echinocarpa Engelm. & Bigel. Pac. R. Rep. iv. 49 (1856). Type locality, "in the Colorado valley, near the mouth of Williams' river."

Nos. 1891 and 1993 are specimens whose lateral branches are shorter than usual, only 2 to 6 cm., their tubercles closer together, and the whole plant, therefore, much more compact and more densely covered with spines than in the typical form. Such specimens were found near Cottonwood Springs, Nevada (No. 1891), and farther northeastward in Nevada (No. 1993) and Utah. Nos. 132 and 1960 represent the ordinary form of the plant.

This is the common cylindrical-stemmed *Opuntia* of the Mohave Desert region. Throughout the *Larrea* belt northward from Hesperia (No. 132) it occurred almost everywhere, yet it was not found, strange to say, in Death Valley itself nor in the immediate vicinity. In Tehachapi Pass, Walker Pass, and Antelope Valley it ceases abruptly with the desert vegetation, extending a little farther than *Larrea*, but not farther than *Yucca arborescens*.

Opuntia engelmanni occidentalis (Engelm. & Bigel.) Pac. R. Rep. iv. 38 (1856), as *O. occidentalis;* Engelm. Proc. Amer. Acad. iii. 291 (1856). Type locality, "on the western slope of the California mountains, from Quiqual Gungo, east of Los Angeles, to San Pasquale and San Isabel, northeast of San Diego, at an elevation of 1,000 to 2,000 feet."

Near San Bernardino (No. 28).

Opuntia missouriensis DC. Prodr. iii. 472 (1828). Type locality, "in planitiebus aridis ad Missouri."

Reese River Valley (No. 161), Charleston Mountains (No. 314), and about 30 kilometers east of Panaca (No. 1981), localities all in Nevada. The specimens are without flowers. No. 1981 appears to be the same as No. 434 of the King Survey. Its spines are much stouter, fewer, and of more uniform size than those of *O. rutila.* Nos. 161 and 314 have larger, slenderer spines, more nearly like those of the short-spined forms of *O. rutila*, while the smaller ones are appressed to the surface of the joint, as in *O. missouriensis* from the Rocky Mountain region, not divergent as in *O. rutila.* The reference of these specimens to *O. missouriensis* is not entirely satisfactory.

Opuntia parryi Engelm. Amer. Journ. Sci. ser. 2. xiv. 339 (1852). Type locality, "eastern slope of the California mountains, near San Felipe."

In the report of the Whipple Expedition[1] Dr. Engelmann again described this species from specimens collected by Bigelow on "gravelly plains 30 miles west of the Colorado, near the Mohave River," with the remark: "This description refers to the plant brought by the expedition from Mojave River. Several years before this time Dr. Parry had described a plant discovered by him 'on the hills and plains about San Felipe, on the eastern slope of the California mountains,' which had been named after the discoverer. We presume that both plants were identical, but have to remark that Dr. Parry's plant is much larger, having joints of 4 to 8 inches in length, with tubercles 6 to 12 lines long; spines whitish, half an inch long. He describes the flower as 1½ inch in diameter, greenish-yellow, with green stigmas. Fruit not mentioned. Further investigation will be necessary to clear up these doubts." Our plant agrees precisely with the figures and description of Bigelow's Mohave River specimens, yet their identity with the true *O. parryi*, as may be seen from the above quotation, is still uncertain. It is very desirable that good specimens be again collected near San Felipe, and a careful comparison of the two plants made.

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[1] Pac. R. Rep. iv. 48 (1856).

This cactus was found in the upper part of the Lower Sonoran zone, on the western slope of the Charleston Mountains (No. 381); on the eastern slope of the same range between Mountain Springs Pass and Cottonwood Springs; and on the eastern slope of the divide between Towner's and Ash Meadows (No. 430).

Opuntia pulchella Engelm. Trans. St. Louis Acad. ii. 201 (1863). Type locality, "sandy deserts on Walker River, Nevada."

Fish Lake Valley, Nevada (No. 2009).

Opuntia ramosissima Engelm. Amer. Journ. Sci. ser. 2. xiv. 339 (1852). Type locality, "gravelly soil near the Colorado, and in the desert."

Dr. Engelmann subsequently changed the name of this species to *O. tessellata*, the designation under which it is currently known.

This cactus was seen occasionally from Hesperia (No. 131) to a point about 25 kilometers north of Daggett. It occurred again on the western foot-slope of the Charleston Mountains, between Yount's ranch and Mountain Springs Pass, between Cottonwood Springs and Vegas Ranch, in the northern part of Vegas Valley, and on both slopes of the divide northwest of Towner's (No. 431). Dr. Merriam reported it on the Timpahute and Desert Mountains of Nevada; in the valley of the Virgin River, near Bunkerville, Nevada; and near the mouth of Beaverdam Creek, Arizona.

Opuntia rutila Nutt. in Torr. & Gr. Fl. i. 555 (1840). Type locality, "arid clay hills in the Rocky Mountain range, near the Colorado of the West, about lat. 42°," afterward given more specifically by Engelmann[1] "near the Green River in Southern Wyoming."

Nos. 1939 and 1941 have red flowers and, with No. 498, long, reflexed, flexuous, white spines, and linear-oblong to elliptical joints. Nos. 1989 and 2013 have yellow flowers, orbicular joints, and slender, divergent spines seldom exceeding 6 cm. long, and scarcely flexuous. No. 927 has joints of similar form and yellow flowers, but the flexuous spines of the numbers first mentioned. No. 787 is without flowers, but is intermediate between the two forms described, having the rounded joints of one and the flexuous spines of the other. The spines of the latter resemble the hog bristles used by shoemakers, and are commonly 6 to 8 cm. long. One was measured which had attained a length of 19.7 cm. Probably more than one species is included in this collection of numbers, but it is impossible at present to distinguish them clearly. The specimens with orbicular joints and shorter spines may belong to the doubtful *O. histricina* Engelm. & Bigel.

It was collected near Willow Creek, Panamint Mountains (No. 787); near Crystal Spring, Coso Mountains (No. 927); in the Beaverdam Mountains, Utah (No. 1939); near St. Joe, Nevada (No. 1941); at St. George, Utah (No. 1959); at Quartz Spring, Nevada (No. 1989); and in the White Mountains, California (Nos. 2013, 2014)

Opuntia whipplei Engelm. & Bigel. Pac. R. Rep. iv. 50 (1856). Type locality, "from the elevated country about Zuñi to the head of Williams's river."

Our specimens agree in their characters with the typical form of this species, which is a plant of smaller stature and more northerly range than the variety *spinosior* of southern Arizona. Dr. Merriam and Mr. Bailey found the plant along the Upper Santa Clara River, Utah (Nos. 1979, 1980), and on the Highland and Juniper (No. 1991) ranges of Nevada.

FICOIDEÆ.

Sesuvium portulacastrum L. Sp. Pl. i. 446 (1753), under *Portulaca;* L. Sp. Pl. ed. 2. i. 684 (1762). Type locality, "in Curassao," West Indies.

Near Keeler (No. 872).

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[1] Bot. King Surv. 119 (1871).

Mollugo verticillata L. Sp. Pl. i. 89 (1753). Type localities, "in Africa, Virginia."
Near Visalia (No. 1260).

UMBELLIFERÆ.[1]

Hydrocotyle prolifera Kellogg, Proc. Cal. Acad. i. 15 (1854). Type locality not given, but undoubtedly Californian.
A *Hydrocotyle* seen in Cottonwood Spring, at the eastern base of the Charleston Mountains, is undoubtedly of this species.

Velæa kelloggii (Gray) Proc. Amer. Acad. vii. 343 (1868), under *Deweya;* Coult. & Rose, Rev. Umb. 121 (1888). Type locality, "Bolinas Bay, near San Francisco."
Near Fort Tejon (No. 1157).

Velæa parishii Coult. & Rose, Rev. Umb. 121 (1888). Type locality, "San Bernardino Mts.," California.
Near Tejon Pass (No. 1222).

Velæa vestita (Wats.) Proc. Amer. Acad. xvii. 374 (1882), under *Deweya;* Coult. & Rose, Rev. Umb. 122 (1888). Type locality, "summit of Mount Baldy, near San Bernardino, California."
In the margin of Whitney Meadows (No. 1628). [A rare species, collected heretofore only by the Parish Brothers and by Edward Palmer.—J. N. R.]

Eulophus parishii Coult. & Rose, Bot. Gaz. xii. 157 (1887), under *Pimpinella;* Coult. & Rose, Rev. Umb. 112 (1888). Type locality, "damp meadows, Bear Valley, San Bernardino Mts., California."
In Whitney Meadows (No. 1612) and the valley of the South Fork of Merced River (No. 1846).

Eulophus pringlei Coult. & Rose, Rev. Umb. 113 (1888). Type locality, "Emigrant Gap." Dr. Rose informs me that the type specimen was that collected by M. E. Jones at the locality given above.
Between Kernville and Havilah (No. 1050).

Apium graveolens L. Sp. Pl. i. 264 (1753). Type locality European.
This plant, the common celery, was found in abundance in the swamps and along streams at Fort Tejon, in the Cañada de las Uvas. If, as reported, it is an introduced plant, it has become thoroughly well established, so much so indeed that it has in this locality the appearance of an indigenous species.

Berula erecta (Huds.) Fl. Angl. 103 (1762), under *Sium.*
This is *Berula angustifolia* (L.) Koch. It was recorded at Resting Springs (No. 271), Winters's ranch, Pahrump Valley, Ash Meadows, Cottonwood Spring, Vegas Ranch, and at several points between Lone Pine and Indian Wells. The plant is one of common occurrence in rivulets of fresh water throughout the desert and within the *Larrea* belt.

Osmorrhiza brachypoda Torr. in Durand, Pl. Pratt. 89 (1855). Type locality, "Near the banks of Deer Creek," California.
Near Fort Tejon (No. 1171).

Osmorrhiza nuda Torr. Pac. R. Rep. iv. 93 (1857). Type locality, "shady woods, Napa valley," California.
Valley of the Kaweah River (No. 1362).

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[1] The Umbelliferæ have been determined by Dr. J. N. Rose.

Cymopterus longipes Wats. Bot. King Surv. 124 (1871). Type locality, "Wahsatch Mountains near Salt Lake City, and on Antelope Island; 5,000 feet altitude."

About 30 kilometers east of Panaca, Nevada (No. 1974). [This is a peculiar form with bipinnate leaves, their ultimate segments oblong and obtuse; peduncles a little longer than the leaves; and fruit wings broad, thin, equal, and much corrugated.—J. N. R.]

Cymopterus panamintensis Coulter & Rose sp. nov.

Caudex stout, branching, clothed with an abundance of old leaf-sheaths; flowering scape 7.5 to 10 cm. high, glabrous and purplish; leaves finely dissected, ternate, then once or twice pinnate; ultimate segments tipped with a slender, bristle-like apiculation; involucre none; involucels small, gamophyllous, somewhat one-sided, purplish, cleft into ovate, acuminate segments; rays (in flower) about 12 mm. long; pedicels short; flowers greenish-yellow; fruit 10 mm. long, glabrous, the 5 wings of the carpel broad and very thick at base; oil-tubes 3 or 4 to the interval, 4 on the commissure; seed-face deeply concave.

This species has several characters in common with *C. cinerarius*, but its yellow flowers, ternate leaves, larger fruit, etc., seem to separate it clearly from that species.

Type specimen in the United States National Herbarium, No. 508, Death Valley Expedition; collected March 30, 1891, near Pete's garden, in Johnson Cañon, Panamint Mountains, California, by Frederick V. Coville.

Cymopterus terebinthinus Torr. & Gr. Fl. i. 624 (1840). Type locality, "sandy grounds on the Wallawallah River, Oregon."

In the Panamint Mountains (No. 545), Argus Mountains (No. 739), and Sierra Nevada (No. 1392).

Selinum capitellatum (Gray) Proc. Amer. Acad. vi. 537 (1865), under *Sphenosciadium;* Wats. Bot. King Surv. 126 (1871). Type locality, "in the Sierra Nevada, near Ebbett's Pass [Alpine County], alt. 7–8,000 feet, by a stream."

Near Mineral King, Sierra Nevada (No. 1475).

Angelica lineariloba Gray, Proc. Amer. Acad. vii. 347 (1868). Type locality, "Ostrander's Meadows, Yosemite Valley, alt. 8,000 feet."

Near Mineral King (No. 1479).

Peucedanum parishii Coult. & Rose, Bot. Gaz. xiii. 209 (1888). Type locality, "California, Bear Valley, alt. 6,500 feet."

In the Panamint mountains (Nos. 541, 745).

Peucedanum vaseyi Coult. & Rose, Bot. Gaz. xiii. 144 (1888). Type locality, "San Bernardino Mountains, California."

On the Darwin Mesa (No. 789).

Peucedanum villosum Wats. Bot. King Surv. 131 (1871)—Nutt. MS. Type locality, "on the plains of the Platte."

Mount Magruder, Nevada (No. 2008).

Heracleum lanatum Mx. Fl. Bor. Amer. i. 166 (1803). Type locality, "in Canada."

Valley of the Kaweah River (No. 1368).

Leptotænia californica Nutt. in Torr. & Gr. Fl. i. 630 (1840). Type locality, "St. Barbara, Upper California."

Near Fort Tejon (No. 1162).

Daucus pusillus Mx. Fl. i. 164 (1803). Type locality, "in campestribus Carolinæ."

Near Tehachapi (No. 1114).

CORNACEÆ.

Cornus occidentalis (Torr. & Gr.) Fl. i. 652 (1840), as *C. sericea occidentalis*. Type locality, as taken from Chamisso's specimen,[1] "ad portum St. Francisci Californiae."

This is the earliest published name for *C. pubescens* Nutt. Sylv. iii. 54 (1842–53). Our specimens, collected in Tejon Cañon (No. 1221), were determined by W. H. Evans. This plant differs from typical *C. pubescens* in its large (8 to 10 cm. broad) cymes, and in its globular stones 4 to 5 mm. in diameter.

Garrya veatchii Kellogg, Proc. Cal. Acad. v. 40 (April, 1873). Type locality, "on Cerros Island."

This, as already pointed out,[2] is the *G. flavescens palmeri* of the Botany of California. We found it only on the summit and southern slope of Cajon Pass, San Bernardino Mountains (Nos. 44, 156).

Garrya veatchii flavescens (Wats.) Amer. Nat. vii. 301 (May, 1873), as *G. flavescens;* Coult. & Evans, Bot. Gaz. xv. 96 (1890). Type locality, "from Southern Nevada and Utah to Arizona and New Mexico."

San Francisco Mountain (No. 7), and Charleston Mountains (No. 1878).

Garrya wrightii Torr. Pac. R. Rep. iv. 136 (1857). Type locality, "on rocks, base of San Francisco Mountain," Arizona.

San Francisco Mountain, Arizona (No. 8).

CAPRIFOLIACEÆ.

Sambucus glauca Nutt. in Torr. & Gr. Fl. ii. 13 (1841). Type locality, "plains of the Oregon, near the Blue Mountains."

In the Cañada de las Uvas (No. 1165), and in Wood Cañon, Grapevine Mountains (No. 1761). The former has unusally broad, deeply and sharply serrated leaves.

Sambucus melanocarpa Gray, Proc. Amer. Acad. xix. 76 (1883). Type localities, "in New Mexico," "in the Wahsatch," "in the mountains of Montana," "in the Sierra Nevada, California," and, "in the cascades of Oregon."

Near Whitney Meadows, Sierra Nevada (No. 1655).

Symphoricarpos longiflorus Gray, Journ. Linn. Soc. xiv. 12 (1875). Type locality, "Pahranagat Mountains, in the south-eastern part of Nevada."

This species was collected in Willow Creek Cañon, Panamint Mountains (No. 836); near Crystal Spring, Coso Mountains (No. 941); and at Pahroc Spring, Lincoln County, Nevada (No. 1987). It probably occurred in many other localities.

Symphoricarpos rotundifolius Gray, Pl. Wright. ii. 66 (1853). Type locality, "sides of mountains around the copper mines, New Mexico."

In the Sierra Nevada (Nos. 1191, 1445). The relation of the plants referred to this species and to *S. oreophilus* is not well understood. The specimens on which the latter species was founded were collected in the Rocky Mountains of Colorado by Dr. C. C. Parry in 1862.

Lonicera cærulea L. Sp. Pl. i. 174 (1753). Type locality European.

Near Whitney Meadows (No. 1710).

Lonicera conjugialis Kellogg, Proc. Cal. Acad. ii. 67 (1860–61). Type locality, "Washoe," Nevada.

Near Mineral King, Sierra Nevada (No. 1415).

Lonicera interrupta Benth. Pl. Hartw. 313 (1849). Type locality, "Juxta fl. Carmel prope Monterey," California.

Near Havilah (No. 1075).

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[1] Cham. & Schlecht. Linnæa, iii. 139 (1828).

[2] Bot. Gaz. xv. 96 (1890).

Lonicera involucrata Banks in Spreng. Syst. Veg. i. 759 (1825). Type locality, "Amer[ica] bor[ealis]."
Near Mineral King, Sierra Nevada (No. 1424).

Lonicera subspicta Hook. & Arn. Bot. Beech. 349 (1841). Type locality Californian.
Near Fort Tejon (No. 1169).

RUBIACEÆ.

Cephalanthus occidentalis L. Sp. Pl. i. 95 (1753). Type locality, "in America septentrionali."
Near Bakersfield (No. 1237).

Kelloggia galioides Torr. Bot. Wilkes Exped. xvii. 332 (1874). Type locality, "Walla-Walla River," Washington.
Near Mineral King, Sierra Nevada (No. 1489).

Galium andrewsii Gray, Proc. Amer. Acad. vi. 537 (1865). Type localities, "near Fort Tejon," "Dry Hills, Atascadero," "Santa Inez Mountains, near Santa Barbara, near Kirka Pass, and near Monterey."
Between Kernville and Havilah (No. 1061).

Galium angustifolium Nutt. in Torr. & Gr. Fl. ii. 22 (1841). Type locality, "St. Francisco," California.
Near Caliente (No. 1098).

Galium aparine L. Sp. Pl. i. 108 (1753). Type locality European.
Tejon Mountains (No. 1187).

Galium bifolium Wats. Bot. King Surv. 134 (1871). Type localities "in the Trinity, Battle and East Humboldt Mountains, Nevada, and in the Wasatch, 5–7,100 feet altitude."
Near Mineral King, Sierra Nevada (No. 1493).

Galium matthewsii Gray, Proc. Amer. Acad. xix. 80 (1883). Type locality, "arid district in Inyo Co., California."
Willow Creek Cañon, Panamint Mountains (No. 831).

Galium multiflorum Kellogg, Proc. Cal. Acad. ii. 97 (1861). Type locality, "Washoe," Nevada.
Southern Sierra Nevada (Nos. 1066, 1183). Our specimens, like Palmer's No. 214, of the year 1888, collected in the same region, are more roughly pubescent than is usual in the species.

Galium stellatum Proc. Cal. Acad. ii. 97 (1861). Type locality, "Cerros [or Cedros] Island."
Surprise Cañon, Panamint Mountains (No. 715).

Galium trifidum L. Sp. Pl. i. 105 (1753). Type locality, "in Canada."
Lyon Meadow, Sierra Nevada (No. 1737).

Galium triflorum Mx. Fl. i. 80 (1803). Type locality, "in umbrosis Canadæ sylvis."
Valley of the Kaweah River (No. 1347).

VALERIANACEÆ.

Valeriana sylvatica Richards. Bot. App. 730 (1823)—Banks MS. Type locality, "on the Clear Water River," Idaho.
Near Mineral King, Sierra Nevada (No. 1486).

COMPOSITÆ.

Hofmeisteria pluriseta Gray, Pac. R. Rep. iv. 96 (1857). Type locality, "in a cañon at Bill Williams' fork, now called Williams' river," Arizona.

This was found in a cañon of the Funeral Mountains, opposite Bennett Wells (No. 207); in the south end of the same range, within a few miles of Saratoga Springs (No. 256), and in a cañon west of Amargosa; in the mountains east of Resting Springs; at Devil Hole, Ash Meadows; in the Vegas Wash; and in Johnson and Surprise cañons, Panamint Mountains. The plant grew always at the base of a rocky cliff or in its crevices, and within the limits of the Lower Sonoran zone.

Coleosanthus atractyloides (Gray) Proc. Amer. Acad. viii. 290 (1873), under *Brickellia;* Kuntze, Rev. Gen. Pl. i. 328 (1891). Type locality, "Utah, near the Rio Colorado."

On the rocks about the upper water-hole at Lone Willow Springs (No. 165); on the eastern slope of Lone Willow Peak (No. 186); in the mountains east of Resting Springs; in the Funeral Mountains, at a point west of Amargosa; on the rocks about Devil Hole, Ash Meadows; in Johnson, Willow Creek, and Suprise cañons, Panamint Mountains; and at the western foot of the Inyo Mountains, near Swansea. The species never grows on the open mesa, but in the clefts of rocks, confining itself to the Lower Sonoran zone. It is a frequent and characteristic plant of such situations.

Coleosanthus desertorum Coville, Proc. Biol. Soc. Wash. vii. 68 (1892), under *Brickellia.* Type locality as given below.

"Shrubby, about 1 m. high; branches minutely white-tomentose, becoming glabrous in the second or third year, but still with a white epidermis, afterward gray; leaves alternate, minutely cinereous-tomentose; petioles 2 to 5 mm. long; blades deltoid ovate, truncate at the base, crenate-dentate, commonly 3 to 8 mm. long, on vigorous shoots reaching 16 mm. in length; heads in glomerules of 2 to 4 flowers, on short leafy branches from a main axis, or in the second or third year the branches elongated and divaricate and bearing a single terminal glomerule; involucre 7 to 8 mm. high, about 10- to 12-flowered; bracts 3-nerved, with traces of minute tomentum, 1 mm. or less wide, bluntly acute, the outermost oblong-lanceolate, all widely recurved after the maturing of the achenia; achenia 2 mm. long, sparingly short-hispid; pappus scabrous.

"This plant differs from *B. californica* in its more shrubby branches, whiter stems, much smaller canescent leaves, and heads smaller throughout. In *B. californica* the involucres are commonly 10 to 12 mm. long and the bracts obtuse, while the achenia are 3 mm. long.

"Type specimen in the United States National Herbarium; collected November 7, 1889, between Banning and Seven Palms, on the Southern Pacific Railroad, California, by C. R. Orcutt.

"The type specimen of *B. californica* was collected by Douglas probably near San Francisco or Monterey. That species is known in the coast region of California from Mendocino County as far south at least as San Diego. Specimens from Utah and Arizona have been referred to *B. californica*, but only with doubt. The new species is known only from the Colorado and Mohave Desert regions. It shows close relationship, too, with the type form of *B. reniformis*, but differs from it, as from *B. californica*, in canescence and size of leaves, heads, and achenia."

The plant occurred at the upper water-hole at Lone Willow Spring (No. 164), in the Funeral Mountains at a point west of Amargosa, and again between Furnace Creek Ranch and Ash Meadows. All its stations were in cañons, and within the *Larrea* belt.

Coleosanthus linifolius (Eaton) Bot. King Surv. 137 (1871), under *Brickellia;* Kuntze, Rev. Gen. Pl. i. 328 (1891). Type locality, "sandy bottoms of American Fork, Jordan Valley, Utah."

Between Darwin and Keeler (No. 943).

Coleosanthus longifolius (Wats.) Amer. Nat. viii. 301 (1873), under *Brickellia;* Kuntze, Rev. Gen. Pl. i. 328 (1891). Type localities, "Southern Nevada" and "Northern Arizona."

This shrub was seen in Surprise and Willow Creek cañons, Panamint Mountains: in a cañon on the west slope of the Inyo Range, near Swansea; and near the mouth of Cottonwood Creek, on the west shore of Owens Lake. It grew along the beds of streams, usually those that do not dry up in the summer, and it scarcely ever exceeded the limits of the Lower Sonoran zone. At Brewery Spring, in Surprise Cañon, the plants commonly reach a height of 2 meters, and one of them measured 2.9 meters.

Bebbia juncea aspera Greene, Bull. Cal. Acad. i. 180 (1885). Type locality not mentioned, but geographic range given as "southern borders of California and adjacent Arizona."

The type specimens of this species were collected at the Bay of Magdalena, Lower California, and were referred to the genus *Carphephorus*.[1] That form has been collected since in several parts of Lower California and the adjacent lands. The variety *aspera*, which alone is known to occur in the United States, has smaller, narrower heads than the type, while the involucral bracts are all lanceolate and acute. In the type form the bracts, except the scarlet inner ones, are from ovate to oblong-ovate, and broadly rounded or very abruptly acute at the apex. The varietal name *aspera* is unfortunate, as the stems are usually quite glabrous and only occasionally short-hispid.

The plant grew in Furnace Creek Cañon (No. 238); in the Funeral Mountains, near Saratoga Springs and west of Amargosa; in Resting Springs Valley and Resting Springs Mountains; between Vegas Ranch and Corn Creek, in Vegas Valley, Nevada; and in Johnson and Willow Creek cañons, Panamint Mountains. It is a characteristic though scarcely abundant species of the Lower Sonoran zone.

Gutierrezia microcephala (DC.) Prodr. v. 313 (1836), under *Brachyris;* Gray, Pl. Fendl. 74 (1849). Type locality, "in Mexico prope locum dictum Sallito."

Specimens were collected only near Lone Willow Spring (No. 178) and in Pahrump Valley (No. 291), but the plant occurred at other points.

Amphiachyris fremontii Gray, Bost. Journ. Nat. Hist. v. 108 (1845), under *Amphipappus;* Gray, Proc. Amer. Acad. viii. 633 (1873). Type locality, "along the Mohave River."

This species was first distinguished from the other desert shrubbery February 2, 1891, in the Funeral Mountains, a few miles north of Saratoga Springs (No. 260). From that time it was seen frequently: in Resting Springs Valley and the mountains east of it; on the mesa east of Winters's ranch, Pahrump Valley, Nevada; at Bunkerville, Nevada (No. 1934); in the Funeral Mountains, west of Amargosa; on the rocks about Devil Hole, Ash Meadows; in Johnson Cañon, Panamint Mountains, and the wash leading from it; and in Surprise Cañon, in the same range. The shrub is one of frequent occurrence in the desert, yet it never forms a conspicuous part of the vegetation. It is a well-defined Lower Sonoran species, and extends from the upper limit of *Larrea* down to an altitude of about 2,500 feet. The favorite habitat of the shrub is on rocky mountain slopes, but it often occurs in gravelly washes, and sometimes on an open mesa.

Heterotheca grandiflora Nutt. Trans. Amer. Phil. Soc. new ser. vii. 315 (1841). Type locality, "on rocks near the sea, round St. Barbara, Upper California."

Near San Bernardino (No. 22).

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[1] Benth. Bot. Sulph. 21 (1844).

Chrysopsis breweri Gray, Proc. Amer. Acad. vi. 542 (1865). Type locality, "near Sonora Pass and Ebbett's Pass, in the Sierra Nevada, common at the elevation of 4,000 to 8,000 feet."

Between Mineral King and Farewell Gap (No. 1485).

Aplopappus apargioides Gray, Proc. Amer. Acad. vii. 354 (1868). Type locality, "at Soda Springs, on the Tuolumne River [California], alt. 9,700 feet."

In the high Sierra Nevada (Nos. 1608, 2133).

Aplopappus bloomeri Gray, Proc. Amer. Acad. vi. 541 (1865). Type locality, "on Mount Davidson, Nevada."

Near Soda Springs, Sierra Nevada (Nos. 1600, 1728).

Aplopappus cuneatus Gray, Proc. Amer. Acad. viii. 635 (1873). Type locality, "California, in 'Bear Valley, alt. 4,500 feet.'"

In our specimens, as well as in others collected in the Colorado Desert by C. R. Orcutt, the leaf-blades are commonly 12 mm. and sometimes 20 mm. long, while in most localities they reach only 4 to 8 mm. The singular distribution of the species leads one to suspect that it may include more than one species or variety.

It was seen in but few localities: on the east slope of the Slate Range, west of Lone Willow Spring (No. 185); on the east slope of the Panamint Mountains, near the head of Johnson Cañon, growing on exposed rocks in the piñon belt; and in Surprise Cañon, near Brewery Spring (No. 599). In all these localities it grew not far either above or below the line between the Upper and Lower Sonoran. Its habitat was always the clefts of rocks, usually in cañons.

Aplopappus interior Coville, Proc. Biol. Soc. Wash. vii. 65 (1892). Type locality as given below.

"Related to *A. linearifolius* DC., but differing in its shorter leaves (12 to 20 mm.), subulate-bracteate peduncle, shorter, acute, involucral bracts, and smaller rays 9 to 11 mm. long. In *A. linearifolius* the larger leaves are 30 to 40 mm. long, the peduncles leafy-bracted, the involucral bracts 11 to 14 mm. long, including the filiform-subulate acumination, and the rays 13 to 15 mm. long.

"Type specimen in the United States National Herbarium, No. 794, Death Valley Expedition; collected May 20, 1891, about 4 miles southeast from Mill Cañon Divide, at the northern edge of the Darwin Mesa, Inyo County, California, by Frederick V. Coville.

"*A. linearifolius*, first collected in California by Douglas, probably near San Francisco or Monterey, is known only from the coast ranges southward from San Francisco Bay. *A. interior* is a species of the desert mountains, and has been collected in the higher elevations of the Lower Sonoran region from southern Utah, northwestern Arizona, and Inyo County, California, southward to the extra-coastal region of San Diego County."

This shrub was seen in flower in Johnson (No. 503), Mill Creek (No. 794), and Willow Creek cañons, Panamint Mountains; and at Crystal Spring, Coso Mountains (918), growing in the Upper Sonoran zone, below the piñon belt. It was seen in Tehachapi Cañon from about a mile west of Cameron to its eastern end, between the *Larrea* and piñon belts; and at several points between Walker Pass and Caliente. It probably occurred frequently at this altitude in other parts of the desert, but in its winter condition it was not distinguished from other similar shrubs.

Aplopappus monactis Gray, Proc. Amer. Acad. xix. 1 (1883). Type locality, "borders of the Mohave Desert, S. E. California."

Specimens were collected near Hesperia (Nos. 48, 53); in Mill Creek Cañon, Panamint Mountains (No. 802); near Lone Pine (No. 893); in the Cañada de las Uvas (No. 1144); and in Sarcobatus Flat, Nevada (No. 2002). The species is characteristic of the upper altitudes of the Lower Sonoran zone, and is probably an abundant plant in many other localities of the Mohave Desert region.

Aplopappus pinifolius Gray, Proc. Amer. Acad. viii. 636 (1873). Type locality, "near Los Angeles [California], in a dry river-bed."

On the south slope of the San Bernardino Mountains (No. 123).

Aplopappus racemosus virgatus Gray, Proc. Amer. Acad. vii. 354 (1868), as *A. paniculatus virgatus;* Gray, Syn. Fl. ii. pt. i. 127 (1878). Type locality, "Bridgeport [Mono County, California], on the eastern side of the Sierra, in alkaline soil."

At Resting Springs (No. 269).

Aplopappus whitneyi Gray, Proc. Amer. Acad. vii. 353 (1868). Type locality, "Mono Trail and Sonora Pass [California], in open woods, alt. 9,000 feet." The points are on the crest of the Sierra Nevada westward from Mono Lake.

Near Farewell Gap, Sierra Nevada (No. 1745).

Acamptopappus sphærocephalus Gray, Pl. Fendl. 76 (1849), under *Aplopappus* (§ *Acamptopappus*); Gray, Proc. Amer. Acad. viii. 634 (1873). Type locality, "California."

Not until it began to flower could this shrub be identified, and therefore in the earlier months of the season's work no records of its occurrence were kept. After June 1 it was found near Crystal Spring, Coso Mountains, at Lone Pine (No. 890), and southward along the eastern base of the Sierra Nevada to Walker Pass. Again on emerging into the Mohave Desert through Tehachapi Pass we found it continuing westward across Antelope Valley as far as the desert vegetation extended. It is a characteristic shrub of the upper altitudes of the *Larrea* belt, and is undoubtedly scattered widely in the desert.

Bigelovia arborescens Gray, Bot. Mex. Bound. 79 (1859), under *Linosyris;* Gray, Proc. Amer. Acad. viii. 640 (1873). Type locality, "California."

In the valley of the Kaweah River (No. 1753). This is one of the plants that, like *Adenostoma fasciculatum*, are common to the coast ranges and to the western slope of the Sierra Nevada.

Bigelovia bolanderi Gray, Proc. Amer. Acad. vii. 354 (1868), under *Linosyris;* Gray, Proc. Amer. Acad. viii. 641 (1873). Type locality, "Mono Pass [California], at 9,000 to 10,000 feet of elevation."

In the high Sierra Nevada (No. 1690). The leaves of our specimens are much narrower than those of the type, and this, together with the racemose-paniculate inflorescence, suggests a too close relationship with *B. parryi* of the Rocky Mountains.

Bigelovia graveolens (Nutt.) Gen. ii. 136 (1818), under *Chrysocoma;* Gray, Proc. Amer. Acad. viii. 644 (1873). Type locality, "on the banks of the Missouri in denudated soils."

The forms that have been referred to this species are so badly distinguished, and their types so poorly known, that the reference of a specimen to any of the varieties is very unsatisfactory. It appears likely, too, that Pursh's specific name *nauseosa* must be adopted. No. 652 is a winter specimen of a plant whose leaves drop off early, like those of *B. mohavensis*, but it has the whitened stems of *B. graveolens*.

Although this shrub and *B. viscidiflora* are very generally diffused in the regions of the Sierra Nevada, Rocky Mountains, and Great Basin, no satisfactory account of their distribution in the Death Valley region can be given. The flowerless state of the different varieties, in which condition only they could be observed during our experience in the desert, did not furnish sufficient diagnostic characters for accurate identification. It may be said in general that *B. graveolens* was sometimes found at as low an altitude as 900 meters, but usually at a higher altitude, sometimes above the limit of *Larrea;* while *B. viscidiflora* ranges a little higher. Wherever either species occurred in abundance the soil was fertile, and responded profitably to irrigation. Specimens were collected in Surprise Cañon, Panamint Mountains

(Nos. 617, 652); near Soda Springs, Sierra Nevada (No. 1724); and at Beaverdam, Nevada (No. 1936).

Bigelovia mohavensis Greene in Gray, Syn. Fl. i. pt. ii. 138 (1884). Type locality, "on the Mohave Desert."

On the western slope of the Charleston Mountains (No. 298). Our specimen was collected in winter and is therefore imperfect, but it appears to belong here.

Bigelovia paniculata Gray, Bot. Mex. Bound. 80 (1859), as *Linosyris viscidiflora paniculata;* Gray, Proc. Amer. Acad. viii. 644 (1873). Type locality, "California."

This species, when seen in the field, would never be confounded with *B. teretifolia*, as it sometimes is in the herbarium. It grows about 2 meters high, in sandy and gravelly washes of the open desert, or sometimes in the bottoms of cañons, and has foliage of a pale green color. *B. teretifolia* is of a darker green, attains a height of 0.5 to 1 meter, and grows on cañon walls and on rocky slopes.

B. paniculata was recorded about 8 kilometers north of Resting Springs (No. 280); on both slopes of the divide north of Twelve Mile Spring, Resting Springs Valley; between Cottonwood Springs, Nevada, and Vegas Ranch; in the Vegas Wash, near its mouth; and in Johnson and Surprise cañons, Panamint Mountains. At no point was it seen above the Lower Sonoran zone.

Bigelovia teretifolia (Dur. & Hilg.) Pl. Heerm. 41 (1855), under *Linosyris;* Gray, Proc. Amer. Acad. viii. 644 (1873). Type locality, "all over the mountains, round the Tejon Valley," California.

This species occurred at the upper water-hole, Lone Willow Spring (No. 163); on the south slope of Browns Peak (No. 179); north slope of Lone Willow Peak; west of Amargosa, in the Funeral Mountains; in Johnson, Surprise (596), and Mill Creek cañons, Panamint Mountains; on Gold Mountain, Nevada (No. 2004); and in Tehachapi Pass. This is a species growing in cañons and rocky clefts, as noted above. It is a well-defined desert plant and ceases abruptly with the desert flora.

Bigelovia veneta (H. B. K.) Nov. Gen. & Sp. iv. 68 (1820), under *Baccharis;* Gray, Proc. Amer. Acad. viii. 638 (1873). Type locality, "in declivitate montium soli occidentali obversorum prope Cuernavoca." This city is in the State of Morelos, southern Mexico.

Found at Resting Springs (No. 268) and northward in Resting Springs Valley; at Winter's ranch, Pahrump Valley; at Ash Meadows; between Cottonwood Springs and Vegas Ranch, Nevada; between Corn Creek and Towner's ranch, Vegas Valley; and about a dry lake between Towner's and Ash Meadows. All these points are in the Lower Sonoran zone. The habitat of the plant is moist, alkaline soil.

Bigelovia viscidiflora (Hook.) Fl. Bor. Amer. ii. 24 (1834), under *Crinitaria;* DC. Prodr. vii. 279. Type localities, "on the barren plains of the Columbia, from the Great Falls to the mountains, and along the Salmon River, N. W. America."

This plant has long passed under the new specific name *douglasii*, which Dr. Gray proposed for it. For its occurrence in the Death Valley region, see *B. graveolens*.

Solidago elongata Nutt. Trans. Amer. Phil. Soc. new ser. vii. 327 (1841). Type locality, "Wappatoo Island and the plains of the Oregon."

Along Willow Creek, Panamint Mountains (No. 958), and at Soda Springs, Sierra Nevada (No. 1592).

Solidago multiradiata scopulorum Gray, Proc. Amer. Acad. xvii. 191 (1882). Tpye locality, "higher Rocky Mountains to New Mexico, Utah, etc."

This species is apparently always distinguishable from *S. humilis* by its not only acute but also fimbriate-ciliate involucral bracts. No. 1610 is a dwarfed form only 8 cm. high, from the dry open soil about Whitney Meadows, while No. 1397 attains a height of 50 cm. and grows in moist soil at a lower elevation. This larger form is identical with that found in the Rocky and Cascade mountains, as well as those of northern Utah. It has not been reported before from the Sierra Nevada, yet it seems to differ from the smaller form only in its size.

Solidago occidentalis (Nutt.) Trans. Amer. Phil. Soc. new ser. vii. 326 (1841), under *Euthamia;* Torr. & Gr. Fl. ii. 226 (1842). Type locality, "banks of the Oregon and Wahlamet, and Lewis River, in the Rocky Mountains."

North Fork of Kern River (No. 1735).

Solidago spectabilis (Eaton) Bot. King Surv. 154 (1871), as *G. guiradonis spectabilis;* Gray, Proc. Amer. Acad. xvii. 193 (1882). Type locality, "stream banks, mountains of western Nevada to the East Humboldt Mountains; 5,500 to 7,000 feet elevation."

In these specimens the involucral bracts are acuminate instead of obtuse, as in the type specimens, but in this respect they are identical with some of the Wheeler Survey plants, originally named *S. guiradonis*, but subsequently referred by Gray to *S. spectabilis.* The plant occurred in Furnace Creek Cañon, Funeral Mountains (No. 212); in Resting Springs Valley (No. 286); at Ash Meadows; at Mountain Springs, Charleston Mountains; at several springs in Vegas Valley; and in Johnson, Surprise, and Hall cañons, Panamint Mountains. It always grew in soil moistened with scarcely alkaline water, and usually within the limits of the Lower Sonoran zone.

Lessingia lemmoni Gray, Proc. Amer. Acad. xxi. 412 (1886). Type locality, "at Ash Fork, in northern part of Arizona."

This species differs very little in outward appearance from *L. glandulifera*, while both of them are clearly distinct from *L. germanorum*. *L. lemmoni* is almost constantly green throughout, while *L. glandulifera* usually has purple branches and often purple involucral bracts; but the crucial distinction lies in the slender-subulate style-tips of *L. lemmoni* and the obovate or ovate, penicillate style-tips of *L. glandulifera.* An examination of several specimens (Lemmon, 1884, "near Mohave;" Pringle, 1882, "Mojave Desert;" Palmer, 1870, No. 201), besides a duplicate of the type specimen and our own plant, show that subulate style-tips are constant in all those from the Mohave Desert region and eastward, while all plants from intramontane California have the blunt style-tips of *L. glandulifera.* Although the two plants are not widely different, the distinction appears constant.

Our specimens were collected at the eastern base of the Coso Mountains (No. 906).

Lessingia leptoclada microcephala Gray, Proc. Amer. Acad. vii. 351 (1868). Type locality, "on Bear Mountain."

In the valley of the Kaweah River (No. 1324). In these specimens the bristles of the pappus are conjoined at the base into about five phalanges, upon which character mainly, with the smaller size and fewer-flowered anthodia, this plant has been separated[1] as a species. But the same character of the pappus appears in large forms with 15-flowered heads, and, so far as herbarium specimens show, is not constant.

Lessingia tenuis (Gray) Bot. Cal. i. 307 (1876), as *L. ramulosa tenuis.* Type locality,[2] "Peru Creek [Ventura County, California], at 5,100 feet."

At the western base of Frazier Mountain (No. 1199). Full-grown anthodium 6 to 7 mm. high, broadly turbinate; corolla 5 mm. long, the limb regular and purple; style tips truncate-penicillate, with a small subulate appendage among the hairs; pappus composed of about twenty equidistant bristles, or of fewer bristles arranged in five groups, those of each group often reduced to a single one. This plant appears quite distinct from *L. ramulosa*, the anthodia of that species when fully developed being 9 to 10 mm. long, oblong-turbinate, and the corolla 7 to 8 mm. long.

Townsendia scapigera Eaton, Bot. King Surv. 145 (1871). Type locality "dry rocky ridges in the Trinity and Pah-Ute Mountains, Nevada; 5–6, 000 feet elevation."

In the Inyo Mountains (No. 1781).

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[1] Bull. Cal. Acad. 191 (1884).

[2] See also Gray, Syn. Fl. i. pt. ii. 162 (1884).

Eremiastrum bellioides Gray, Pl. Thurb. 321 (1854). Type locality, "on the Californian desert, not far west of the Colorado."

Near Saratoga Springs (No. 254). This plant is not typical *E. bellioides*, but an intergrade between it and *E. bellioides orcuttii*, nearer, however, the former.

Eremiastrum bellioides orcuttii (Wats.) Proc. Amer. Acad. xxv. 132 (1890), as *E. orcuttii*. Type locality, "in the southeastern part of the Colorado desert, in San Diego County, California."

This species of *Eremiastrum* was originally described thus: "Pappus consisting of five, white oblong-ovate laciniate paleæ and as many inner alternate bristles twice as long; in every other respect—habit, foliage pubescence, involucre, etc.—the nearly exact counterpart of *E. bellioides*. From its close resemblance to *E. bellioides* it might be supposed to be a variety of that species, but no intermediate forms are detected among previous collections." From the specimens now collected it is evident that, while the pappus bristles in this plant are commonly 5, they vary from 1 to 8, the paleæ meanwhile remaining comparatively constant. No. 440 is largely typical. In some specimens, commonly the more robust ones, the paleæ are longer and laciniately parted, while at the same time both they and the bristles are more than 5 in number. In short, a complete intergradation exists between the two plants. Nos. 326 and 674 are such intermediate forms. The geographic relationship of the two plants is not well determined, but specimens from Arizona usually belong to the type, while those from the Mohave and Colorado deserts, in California, are oftener of the variety. *Monoptilon bellidiforme*, which can be distinguished from *Eremiastrum* only by its pappus, is undoubtedly a derivative of the same group.

Our specimens were collected in the Funeral Mountains (Nos. 326, 440) and in Panamint Valley (No. 674).

Aster andersonii Gray, Proc. Amer. Acad. vi. 540 (1865), under *Erigeron*; Gray, Proc. Amer. Acad. vii. 352 (1868). Type localities, "Nevada, near Carson City," and "Lake Tenaya, in the Sierra Nevada."

In the high Sierra Nevada (Nos. 1565, 2114). No. 2114 was collected in a meadow closely grazed by cattle, and it has the short spreading leaves and assurgent stems, but not the villous achenia, commonly characteristic of *A. pulchellus*.

Aster canescens tephrodes Gray, Syn. Fl. i. pt. ii. 206 (1884). Type localities, "California, Arizona, and New Mexico."

Near St. Thomas, Nevada (No. 1929).

Aster canescens viscosus (Nutt.) Trans. Amer. Phil. Soc. new ser. vii. 301 (1841), as *Dieteria viscosa;* Gray, Syn. Fl. i. pt. ii. 206 (1884). Type locality, "near Scott's Bluff, on the Platte."

At Soda Springs, Sierra Nevada (No. 1605).

Aster carnosus Gray, Pl. Wright. ii. 80 (1853), under *Linosyris;* Gray, Syn. Fl. i. pt. ii. 202 (1884). Type locality, "low, subsaline valley west of the Chiricahui Mountains, Sonora," Mexico.

This peculiar desert aster was abundant at Resting Springs, Nevada, in the alkaline salt grass meadows (No. 270), and was found also at Ash Meadows and about a soda-flat on the road between the latter point and Towner's ranch. All these localities are in the valley of the Amargosa River.

Aster integrifolius Nutt. Trans. Amer. Phil. Soc. new ser. vii. 291 (1841). "An alpine species growing with the above [*A. andinus*], but at a lower elevation." The type locality of *A. andinus* is "on the highest summits of the Rocky Mountains, near the line of perpetual snow, in 42°."

Near Farewell Gap, Sierra Nevada (No. 1742).

Aster mohavensis.

This shrubby desert *Aster* was first described by Gray[1] as *Aplopappus tortifolius*, but subsequently referred by the same author[2] to *Aster*. It cannot, however, retain its original specific name, since Michaux[3] described an *Aster tortifolius* which is now referred to *Sericocarpus tortifolius*.

The plant occurred on the south slope of Browns Peak (No. 184); on Lone Willow Peak, at 1,825 meters; in the mountains east of Resting Springs, from 750 to 1,050 meters; in the northern end of Resting Springs Valley, at 930 meters; on the western slope of the Charleston Mountains, at 900 and 870 meters; in the Funeral Mountains, west of Amargosa, from 975 to 1,575 meters; near Devil Hole, Ash Meadows; on the eastern slope of the Charleston Mountains, at 945 meters; in Vegas Valley, at 885 meters; in Furnace Creek Cañon, at 720 meters (No. 358); in Johnson Cañon, Panamint Mountains, at 1,700 meters; in Willow Creek and Mill Creek cañons, Panamint Mountains; at the western foot of the Inyo Mountains near Swansea (No. 863); between Keeler and Crystal Spring, Coso Mountains; in Shepherd Cañon, Argus Mountains (No. 732); at several points between Lone Pine and Haway Meadows; and in Antelope Valley. The plant is characteristic of the upper altitudes of the Lower Sonoran zone.

Erigeron armerifolius DC. Prod. v. 291 (1836). Type localities, "in uliginosis subsalsis prope Ircutiam in Dahuria" and "in deserto Kuraico."

In Lyon Meadow, Sierra Nevada (No. 1578).

Erigeron breweri Gray, Proc. Amer. Acad. vi. 541 (1885). Type locality, "Yosemite Valley [California]; alt. 4,000 feet."

At Soda Springs, Sierra Nevada (No. 1604).

Erigeron calvus Coville, Proc. Biol. Soc. Wash. vii. 69 (1892). Type locality as given below.

"Apparently biennial, widely branching from the base, 1 cm. high, sparingly canescent with hirsute pubescence; radical leaves very numerous, blade oblong to obovate, 1 to 1.5 cm. long, tapering into a petiole of twice that length; upper leaves spatulate, becoming much smaller; heads singly pedunculate on the branches, 7 to 8 mm. high, hemispherical, with very many flowers; involucral bracts narrowly linear, acuminate, hirsute; ray flowers numerous, but with rays minute, pink, and shorter than the disk; pappus of ray and disk flowers alike, consisting of several long, stout, closely barbellate bristles (4 mm. long), equaling the disk corollas, and a few intermediate, much shorter ones; achenium compressed, short villous.

"This species resembles in general appearance no described *Erigeron*. Its heads closely resemble those of *E. supplex*, but that species has no ray flowers whatever. Its pubescence is similar to that of *E. concinnus*. The specific name refers to the bald appearance of the heads, due to the minuteness of the rays.

"Type specimen in the United States National Herbarium, No. 870, Death Valley Expedition; collected May 16, 1891, at the foot of the Inyo Mountains, about 4 miles north of Keeler, California, by Frederick V. Coville."

Erigeron canadensis L. Sp. Pl. ii. 863 (1753). Type locality, "in Canada, Virginia, nunc in Europa australi."

On the North Fork of Kern River (No. 1723).

Erigeron compositus Pursh, Fl. ii. 535 (1814). Type locality, "on the banks of the Kooskoosky," now the Clearwater, in northern Idaho.

At Farewell Gap (No. 1576), and near Mount Whitney (No. 2062).

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[1] Bost. Journ. Nat. Hist. v. 109 (1845).

[2] Proc. Amer. Acad. vii. 353 (1868).

[3] Mx. Fl. ii. 109 (1803).

Erigeron concinnus (Hook. & Arn.) Bot. Beech. 350 (1840–41), under *Distasis;* Torr. & Gr. Fl. ii. 174 (1841). Type locality, "Snake River, below the Salmon Falls, Snake country," Idaho.

About 30 kilometers east of Panaca, Nevada (No. 1970).

Erigeron coulteri Porter in Port. & Coult. Fl. Col. 61 (1874). Type locality, "Weston's Pass [Colorado], at 10,000 feet altitude."

Big Cottonwood Meadows, Sierra Nevada (No. 2112).

Erigeron divergens Torr. & Gr. Fl. ii. 175 (1841). Type locality, "Rocky Mountains, and plains of the interior of Oregon."

In Owens Valley (Nos. 1770, 2109).

Erigeron salsuginosus (Richards.) Bot. App. 748 (1823), under *Aster;* Gray, Proc. Amer. Acad. xvi. 93 (1880). Type locality, "on the salt plains in the Athabasca."

Near Mineral King, Sierra Nevada (Nos. 1409, 1472).

Erigeron trifidus Hook. Fl. Bor. Amer. ii. 17 (1834). Type locality, "barren places among the Rocky Mountains."

At an altitude of 400 meters above timber-line on Mount Whitney (No. 2060). This plant has been collected heretofore only in the Rocky Mountains. Dr. Gray considered it a variety of *E. compositus*, but from all the specimens that I have been able to see there appear to be no intergrades.

Erigeron uniflorus L. Sp. Pl. ii. 864 (1753). Type locality European.

In the high Sierra Nevada (Nos. 1537, 1668).

Conyza coulteri Gray, Proc. Amer. Acad. vii. 355 (1868). Type locality not given. Thomas Coulter's Nos. 285 and 286 are probably to be considered the types.

At Winters's ranch, Pahrump Valley (No. 293), growing as a weed in irrigated soil.

Baccharis emoryi Gray, Bot. Mex. Bound. 83 (1859). Type locality, "on the Gila."

This was collected only at Resting Springs (No. 267), but it may have occurred elsewhere. See *B. sergiloides.*

Baccharis glutinosa Pers. Syn. Pl. ii. 425 (1807). Type locality, "in R[egni] Chilensis ruderatis."

This was seen by the writer on the banks of the Colorado River, at the mouth of the Vegas Wash (Nos. 427, 1899), and by Dr. Merriam in the valleys of the Virgin and Muddy rivers, extending along the former to its junction with Beaverdam Creek.

Baccharis sergiloides Gray, Bot. Mex. Bound. 83 (1859). Type locality, "along the Gila or Colorado."

Collected in the Slate Range, west of Lone Willow Spring (No. 189), and in Furnace Creek Cañon (No. 350). At many points in the Lower Sonoran zone, in soil moistened by fresh or only slightly alkaline water, plants of *Baccharis* were found which belong either to this species or to *B. emoryi*, but of which no specimens were collected.

Baccharis viminea DC. Prod. v. 400 (1836). Type locality, "in California."

Near San Bernardino (No. 108).

Pluchea camphorata (L.) Sp. Pl. ed. 2. ii. 1212 (1762), under *Erigeron;* DC. Prodr. v. 452 (1836). Type locality, "in Virginia."

Observed in a few marshes of the Lower Sonoran zone, in the south end of Resting Springs Valley; at Ash Meadows (No. 346); and at Hot Springs, Panamint Valley.

Pluchea sericea (Nutt.) Pl. Gamb. 178 (1848), under *Polypappus*. Type locality, "Rocky Mountains of Upper California."

Furnace Creek Cañon (No. 221). This plant has passed under the name *Tessaria borealis* and later that of *Pluchea borealis*. The former name was printed twice[1] without description, and was first formally published[2] in 1852.

The plant is abundant about the springs in Death Valley, as at Bennett Wells, Furnace Creek (No. 221), Eagle Borax Works, Tule Wells, and Saratoga Springs; and occurs frequently, often in great abundance, at other points, such as Resting Springs, Ash Meadows, the springs of Vegas Ranch, and the Vegas Wash. Dr. Merriam found it at a few points along the Muddy, Virgin, and Santa Clara rivers, Utah.

Stylocline micropoides Gray, Pl. Wright. ii. 84 (1853). Type locality, "hills near Frontera, New Mexico."

Panamint Mountains (No. 640), Panamint Valley (No. 673), and valley of the Virgin River (No. 1914).

Filago californica Nutt. Trans. Amer. Phil. Soc. new ser. vii. 405 (1841). Type locality, "near St. Barbara, Upper California."

Johnson Cañon, Panamint Mountains (No. 489).

Antennaria alpina (L.) Sp. Pl. ii. 856 (1753), under *Gnaphalium;* Gaertn. Fruct. ii. 410 (1791). Type locality European.

Near Farewell Gap, Sierra Nevada (No. 2160).

Antennaria dioica (L.) Sp. Pl. ii. 850 (1753), under *Gnaphalium;* Gaertn. Fruct. ii. 410 (1791). Type locality European.

Near Whitney Meadows (No. 1658).

Gnaphalium palustre Nutt. Trans. Amer. Phil. Soc. new ser. vii. 403 (1841). Type localities, "Rocky Mountains, Oregon, California and Chili."

Near Three Rivers (No. 1292).

Iva axillaris Pursh, Fl. ii. 743 (1814). Type locality, "in Upper Louisiana."

Seen only in Willow Creek Cañon, Panamint Mountains (No. 832); at Canebrake Ranch, on the west slope of Walker Pass; and at Havilah.

Oxytenia acerosa Nutt. Pl. Gamb. 172 (1848). Type locality, "Rocky Mountains, near Upper California."

Specimens of this plant were seen in winter on the alkaline clay mesa between Amargosa and Resting Springs, and on a bank of similar material about one-half mile southwest of Watkins's house at Ash Meadows. The former station is in California, the latter just across the line in Nevada.

Dicoria canescens Gray, Bot. Mex. Bound. 87 (1859). Type locality, "in the sandy desert of the Gila and of the Colorado."

Near Saratoga Springs (No. 247). The generic name was first printed,[3] without description, as *Dicoris*.

The vegetation of dry heaps of drifting sand in the desert is very scanty, for but few plants can live in such places. One of them is the present species, and even it was found in only three places, along the Mohave River at Daggett, near Saratoga Springs (No. 247), and in Owens Valley at the mouth of the first cañon on the road from Keeler to Darwin.

Hymenoclea salsola Torr. & Gr. in Gray, Pl. Fendl. 79 (1849). Type locality, "sandy, saline uplands near the Mohave River, in the interior desert of California."

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[1] Torr. in Emory, Rep. 142 (1848); and Gray, Pl. Fendl. 75 (1849).

[2] Gray, Pl. Wright. i. 102 (1852).

[3] Emory, Rep. 143 (1848).

This shrub was recorded at several points between Daggett and Lone Willow Spring; on Browns Peak; on Lone Willow Peak; in Long Valley (No. 191); near Bennett Wells, in Death Valley; near Saratoga Springs; in Resting Springs Valley; west of Amargosa, in the Funeral Mountains; between Furnace Creek and Ash Meadows; between the latter point and Pahrump Valley; in Vegas Valley; in the Vegas Wash; on the divide northwest of Towner's; near the summit station, between Mohave and Searles's; in Willow Creek and Mill Creek (No. 754) cañons, Panamint Mountains; in a cañon near Swansea; between Keeler and Crystal Spring; on both slopes of Walker Pass; in Tehachapi Cañon; and in Antelope Valley. Dr. Merriam reported it also from Deep Spring Valley, California; from Grapevine Cañon, and Oasis, Emigrant, Timpahute, Pahranagat, Virgin, and Indian Spring valleys, Nevada; and the Beaverdam Mountains and Santa Clara Valley, Utah. The plant grows from the lower to the upper limit of the *Larrea* belt, sometimes reaching into the Upper Sonoran zone. Its favorite habitat is the soil of sandy washes.

Franseria acanthicarpa (Hook.) Fl. Bor. Amer. i. 309 (1834), under *Ambrosia*. Type locality, "banks of the Saskatchawan and Red River."

Nuttall[1] referred Hooker's *Ambrosia acanthicarpa* to the genus *Franseria* with the specific name *hookeriana*, and used this name only for the plant of the Saskatchewan and Columbia River regions, a plant with linear lobes of the leaves, and not canescent. The southern form, to which our specimen belongs, common in California and the Great Basin region, with broader leaf-lobes and canescent with appressed hairs, he considered distinct and named *Franseria montana*, its type locality being "in the Rocky Mountains near the Colorado of the West." Torrey and Gray,[2] however, united the two and the aggregate has since passed as *F. hookeriana*.

The plant was seen at San Bernardino (No. 11); on the banks of the Mohave at Daggett; near Lone Pine; and at several points along our route from the latter place to Visalia. It often occurred as a weed in cultivated soil.

Franseria dumosa Gray in Frem. Second Rep. 316 (1845). Type locality, "on the sandy uplands of the Mohahve river."

This shrub as stated in the narrative portion of the report, is, next to *Larrea tridentata*, the most characteristic plant of the Lower Sonoran zone. Its range practically coincides with that of *Larrea tridentata* and need not be given here. Specimens were collected near Keeler (No. 844).

The plant has an economic interest in being preferred for forage, by horses, to all the other desert shrubs. When, therefore, they are unable to find grass, this shrub will keep them from starvation for a time.

Franseria eriocentra Gray, Proc. Amer. Acad. vii. 355 (1868). Type locality, "east slope of Providence Mountain, Arizona." The Providence Mountains are not in Arizona, but near Ivanpah, in the northeastern part of San Bernardino County, California.

This shrub occurred on the western slope of the Charleston Mountains, both on the road to Clark's sawmill (No. 297) and on the road to Mountain Springs Pass, in the latter place at an altitude of about 1,200 meters. At both points the plants grew in the dry, gravelly bottom of a broad wash. Mr. Bailey collected the plant also at Beaverdam, Arizona (No. 1938). It was found by Dr. Merriam in Pahranagat Valley, Hyko Mountains, Pahranagat Mountains, and on Hungry Hill Summit.

Xanthium spinosum L. Sp. Pl. ii. 987 (1753). Type locality European.

Between Kernville and Caliente, and at frequent intervals in the Tulare Plains.

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[1] Trans. Amer. Phil. Soc. new ser. vii. 345 (1841).

[2] Torr. & Gr. Fl. ii. 294 (1842).

Xanthium strumarium L. Sp. Pl. ii. 987 (1753). Type locality, "in Europa, Canada, Virginia, Jamaica, Zeylona, Japonia."

This weed, the cocklebur, was recorded in the desert only at Resting Springs, and at Mountain Springs, Charleston Mountains. In the Tulare Plains it occurred frequently on irrigated ground.

Gymnolomia multiflora (Nutt.) Pl. Gamb. 171 (1848), under *Heliomeris;* Rothr. Bot. Wheeler Surv. 160 (1876). Type locality, "mountains of Upper California."

Mill Creek Cañon, Panamint Mountains (No. 806). These specimens are perennial, and have their leaves opposite throughout.

Rudbeckia californica Gray, Proc. Amer. Acad. vii. 357 (1868). Type locality, "Mariposa Big-tree Grove," California.

At Soda Springs on Kern River (No. 1591).

Balsamorhiza deltoidea Nutt. Trans. Amer. Phil. Soc. new ser. vii. 351 (1841). Type locality, "near the outlet of the Wahlamet," Oregon.

The Californian plant commonly referred to this species differs from true *B. deltoidea* of Oregon and Washington in its scabrous leaves and hirsute-ciliate, smooth or slightly pubescent involucral bracts, contrasting with the sparingly soft-pubescent leaves and woolly involucral bracts of that plant. It has been described[1] under the name *B. glabrescens* from specimens collected in "Bear Valley montium Sacramento." It will undoubtedly be found necessary to separate the southern form either as a variety or a species.

The plant was found only on the divide between Havilah and Kernville (No. 1067), and on the divide between Havilah and Walker Basin.

Balsamorhiza hirsuta Nutt. Trans. Amer. Phil. Soc. new ser. vii. 349 (1841). Type locality, "dry plains east of Walla-Walla, near the Blue Mountains, and in the Grand Ronde prairie."

About 30 kilometers east of Panaca, Nevada (No. 1977). Our plant is the same as No. 596 of the King Survey, which Professor Eaton and Dr. Gray have referred to this species of Nuttall. I have not been able to examine the type specimen.

Balsamorhiza invenusta (Greene) Pittonia, i. 284 (1889), under *Helianthus.* Type locality, "mountains of Kern County, California."

This plant, although heretofore referred to *Helianthus,* cannot reasonably be placed there, for the linear, quadrangular, slightly compressed achenia are entirely devoid of pappus. Our plant is 55 cm. high, leafy to the top, with alternate or opposite, ovate-lanceolate, acute, scabrous, petiolate, entire leaves 8 to 15 cm. long, the base cordate or tapering. The involucral bracts are herbaceous, narrowly oblong, acute, and scabrous-hispid. In its leafy stems it resembles *Balsamorhiza bolanderi,* but it differs from that species in having no ray-flowers.

The plant has been collected only in the southern Sierra Nevada, the original specimens by Edward Palmer "at a height of 6,000 or 7,000 feet, upon the Green Horn Mountains, 10 or 12 miles west of Kernville, Kern County, Cal.;"[2] the present specimen (No. 1373) in dry soil in grooves of *Pinus jeffreyi,* on the slopes of Big Tree Cañon, between Three Rivers and Mineral King, Tulare County, California.

Viguiera reticulata Wats. Amer. Nat. vii. 301 (1873). Type locality, "Telescope Mountain, southeastern California," not from Nevada, as stated by Gray.[3]

Some incomplete specimens of this plant bearing the date 1872 were collected on the Wheeler Expedition in the vicinity of Telescope Peak; but no other specimens have since been found. Our own specimens were collected in midwinter, in a warm situation, and bore empty fruiting involucres, new leaves, and a few flowering heads.

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[1] Benth. Pl. Hartw. 317 (1849).

[2] Contr. Nat. Herb. i. 1 (1890).

[3] Syn. Fl. i. pt. ii. 271 (1884).

The plant grows about 80 cm. high, and is suffrutescent, like *V. deltoidea* and *V. deltoidea parishii.* Its leaves are ovate, with truncate or cordate base, and acuminate apex, entire, canescent with soft appressed hairs above, prominently reticulated, and loosely tomentose beneath, not scabrous in any part. The achenia are silky throughout, and the pappus is composed of two awns and several shorter intermediate laciniate scales, as in *V. deltoidea.*

The plant was seen in a cañon near Lone Willow Spring; on the northeast slope of Lone Willow Peak; on Browns Peak (No. 183); in the south end of the Funeral Mountains, near Saratoga Springs; on the north slope of the divide between Resting Springs and Pahrump; and in Johnson and Surprise cañons, Panamint Mountains, stations all in the upper part of the Lower Sonoran zone.

Helianthus annuus L. Sp. Pl. ii. 904 (1753). Type locality, "in Peru, Mexico." Dr. Gray says[1] that the type specimens "came not from Peru, nor even from Mexico."

We first found this plant, the common sunflower, at Corn Creek, Vegas Valley, where its dried stems furnished the only fuel that could be obtained. With them, however, we baked bread and did the other necessary cooking for our party. In Tehachapi Valley, the west end of Antelope Valley, and in the Tulare Plains the sunflower occurred abundantly, but in the desert we found it only at the point mentioned above.

Helianthus petiolaris Nutt. Journ. Acad. Phil. ii. 115 (1821). Type locality, "on the sandy shores of the Arkansa."

This smaller sunflower was seen at Resting Springs (No. 273), at Pahrump, and at Ash Meadows (No. 348).

Encelia eriocephala Gray, Proc. Amer. Acad. viii. 657 (1873). Type locality,[2] "interior of California."

This desert sunflower, in the Mohave Desert region, was one of the most abundant and characteristic annual plants of the *Larrea* belt. In Death Valley, late in March, it rendered some portions of the mesa yellow with its flowers. Specimens were collected in Furnace Creek Cañon (No. 361), and in the valley of the Virgin River (No. 1911).

Encelia farinosa Torr. in Emory, Rep. 143 (1848)—Gray MS. Type locality not given. The original specimens were probably collected in the lower Gila country. The plant was recorded only on the mesa in Death Valley, near Bennett Wells (Nos. 202, 476), and in Johnson, Surprise, and Hall cañons, Panamint Mountains, stations all lying well below the upper limit of the *Larrea* belt.

Encelia frutescens Gray, Bot. Mex. Bound. 89 (1859), under *Simsia;* Gray, Proc. Amer. Acad. viii. 657 (1873). Type locality, "Agua Caliente, on the Gila," Arizona.

Our plant is the form with canescent, rather large leaves, the pubescence only slightly scabrous. It appears to be confined to the northern portion of the Upper Sonoran zone, as there are specimens in the National Herbarium from southern Utah, Nevada, and Arizona, as well as the present specimens from the Mohave Desert region. The material and data necessary to define its relation to the more southern form are not at hand.

This shrub, which was not identifiable in the winter, was recorded, after the beginning of its flowering season, in Johnson, Surprise, and Willow Creek cañons, Panamint Mountains; in a cañon of the Inyo Mountains, near Swansea; near Crystal Spring, Coso Mountains; between Lone Pine and Olancha; on the east (No. 1020) and west slopes of Walker Pass; and between Cameron and Mohave.

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[1] Gray, Syn. Fl. i. pt. ii. 272 (1884).

[2] Gray, Pl. Fendl. 85 (1849).

Helianthella argophylla (Eaton) Bot. King Surv. 423 (1871), under *Tithonia;* Gray, Proc. Amer. Acad. xix. 9 (1883). Type locality,[1] "St. George, in southern Utah."

Frutescent perennial, much branched and forming a hemispherical tuft 20 to 30 cm. high, rarely simple; stem and branches thick (8 mm. or much more), closely covered with thick leaf-bases; leaves alternate; blades 5 to 10 cm. long, rhombic-ovate, acute, 3-ribbed, tapering into a petiole of the same length, the whole whitened with short, soft, dense, appressed hairs; branches terminating in single, stout, minutely pubescent, monocephalous, leafless peduncles 30 to 60 cm. high; involucral bracts lanceolate, acute, 2 to 3 cm. long, whitened like the leaves; ray-flowers 25 to 35, neutral; blade 3.5 to 5 cm. long, lemon-yellow, linear-oblanceolate, entire or few-toothed at the apex, minutely pubescent on the back; disk 3.5 to 4.5 cm. broad, convex, lemon-yellow; receptacle convex, about 2 cm. broad; bracts of the receptacle membranaceous, narrowly oblong, conduplicate, several-nerved, the midrib excurrent at the narrow, often laterally 1-toothed, apex into a blunt point minutely pubescent on its back; corolla about 8 mm. long, with a slender tube 3 mm. long, abruptly expanding into a cylindrical throat with 5 short, spreading, externally pubescent teeth; style-tips deltoid-ovate, short-hairy; achenia flat-compressed, 9 to 10 mm. long, wedge-obovate, convex-truncate at the apex, scantily appressed-puberulent; wing thick, spongy, 1 to 2 mm. wide; pappus composed of 2 short, upwardly arcuate-spreading awns, their bases connected by a hardly discernible (in the mature fruit), erose, marginal membrane.

The species is a very striking one, single plants often bearing thirty open anthodia at one time. Heretofore it has been known only by the scant original material collected by Edward Palmer in 1870,[2] but we now have it from three additional stations: the gypsum cliffs along the Vegas Wash (No. 414); and Surprise and Hall (No. 698) cañons, Panamint Mountains, near their mouths. The last two stations are within 4 or 5 miles of each other, the first about 150 miles to the eastward. In all the stations the plant grows upon banks of apparently calcareous clay.

Leptosyne bigelovii Gray, Pac. R. Rep. iv. 104 (1857), under *Pugiopappus;* Gray, Syn. Fl. i. pt. ii. 300 (1884). Type locality, "on the Mohave Creek, in the desert east [west] of the Colorado."

Late in April the lower mountain slopes, within the *Larrea* belt, between Searles's and Mohave, appeared in many places quite yellow with the flowers of this plant, both close at hand and at a distance of several miles. Specimens were collected on the south slope of Browns Peak (No. 175); in Furnace Creek Cañon (No. 466); in Johnson Cañon, Panamint Mountains (No. 528); in Shepherd Cañon, Argus Mountains (No. 742); and near Mill Creek Divide (No. 797).

Madia corymbosa (DC.) Prodr. v. 692 (1836), under *Madaria;* Greene, Pittonia, ii. 218 (1891). Type locality, "in Amer. bor. occid. ad Columbia-Rivier."

Granite Creek, Fresno County, California (No. 1837). Determined by E. L. Greene.

Madia elegans Lindl. Bot. Reg. xvii. t. 1458 (1831)—Don MS. Type locality, "on the north-west coast of North America."

Between Kernville and Havilah (No. 1057) and near Mineral King (No. 1468). No. 1057 is smaller throughout than the typical *Madia elegans*, but Dr. Gray considered the plant a depauperate form of that species.

Madia hispida (DC.) Prodr. v. 692 (1836), as *Madaria corymbosa hispida;* Greene, Pittonia, ii. 217 (1891). Type locality, "in California."

Near Fort Tejon (No. 1172). Determined by E. L. Greene.

Hemizonia heermanni Greene, Bull. Torr. Club, ix. 15 (1882). Type locality, "Tehachapi Pass, Kern County [California], near Keene Station, abundant in groves of *Quercus Douglasii.*"

Near Caliente (No. 1101).

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[1] Proc. Amer. Acad. viii. 657 (1873).

[2] For additional recent notes on this plant, see Zoe, iii. 304 (1893).

Hemizonia pungens (Hook. & Arn.) Bot. Beech. 357 (1840–41), under *Hartmannia;* Torr. & Gr. Fl. ii. 399 (1843). Type locality not given. The original specimens were collected in California by Douglas.

Near Tule River, in the Tulare Plains (No. 1250).

Hemizonia wheeleri Gray, Bot. Cal. i. 617 (1876). Type locality "Tulare Co., Monachay Meadows, etc., upper part of South Fork of Kern River, at 8,200 to 10,000 feet altitude," California.

The type specimen belongs to No. 306 of Rothrock's Wheeler Survey collection, but No. 335 of the same collection has also been referred here. In the latter plant the anthodia are arranged in close cymes at the ends of the branches, while in the former the anthodia are single upon scattered peduncles. Our No. 1395 is identical with Rothrock's No. 306, and Nos. 2121, 2134, and 2136 with his No. 335. The characters of the flowers and achenia, as well as pubescence, are the same in both forms. The bracts of the outer chaff of the receptacle are not distinct, as originally described and figured, but connate for about half their length. All the specimens were collected in the high Sierra Nevada.

Lagophylla ramosissima Nutt. Trans. Amer. Phil. Soc. new ser. vii. 390 (1841). Type locality, "in the prairies near Walla-Walla, in Oregon."

Between Kernville and Havilah (No. 1053).

Layia glandulosa (Hook.) Fl. Bor. Amer. i. 316 (1834), under *Blepharipappus;* Hook. & Arn. Bot. Beech. 358 (1840–41). Type locality, "on the plains of the Columbia, in sandy soils, under the shade of *Purshia* and *Artemisia.*"

Shepherd Cañon, Argus Mountains (No. 738). It should be noted that the priority of this genus over the leguminous *Layia* of Hooker and Arnott rests upon the statement:[1] "If this were to form a new genus we would propose the name of *Layia*, after one of the discoverers," followed by a generic diagnosis separating it from *Tridax.* Subsequently in the same work[2] the leguminous genus *Layia*, afterward referred to *Ormosia*, was published, but De Candolle[3] considered the first mention sufficient to constitute publication, and adopted the name for the genus of Compositæ.

Perityle emoryi nuda (Torr.) Pac. R. Rep. iv. 100 (1857), as *P. nuda;* Gray, Bot. Cal. i. 397 (1876). Type locality "arroyos and cañons at Williams' river, and on hills near the Colorado of the West."

Determinations authenticated by J. N. Rose. This plant occurred in the *Larrea* belt in a cañon of the Funeral Mountains, west of Amargosa (No. 324); between Ash Meadows and Furnace Creek Ranch (No. 437); in Johnson (No. 546), Hall (No. 699), and Surprise cañons, Panamint Mountains; and in Panamint Valley (No. 669).

Baileya multiradiata Harv. & Gr. in Emory, Rep. 144 (1848). Type locality, "along the Del Norte and in the dividing region between the waters of the Del Norte and those of the Gila."

Near Winters's ranch, Pahrump Valley, Nevada (No. 296).

Baileya multiradiata pleniradiata (Harv. & Gr.) in Gray, Pl. Fendl. 105 (1849), as *B. pleniradiata.* Type locality, "California."

Between Darwin and Keeler (No. 945).

The original *B. multiradiata* of Emory's Report is the long-peduncled broad-headed form called variety *nudicaulis* in Gray's Synoptical Flora, while the *B. multiradiata* of the latter work is the *B. pleniradiata* of the Plantæ Fendlerianæ.

Psilostrophe cooperi (Gray) Proc. Amer. Acad. vii. 358 (1868), under *Riddellia;* Greene, Pittonia, ii. 176 (1891). Type localities, "gravelly banks at Fort Mohave," "on the Colorado," and "Camp Grant, &c., Arizona."

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[1] Hook. & Arn. Bot. Beech. 148 (1833).

[2] Ibid. 182 (1833).

[3] Prodr. vii. 294 (1839).

Seen only at Winters's ranch, Pahrump Valley (No. 292), and in the Vegas Valley, between Cottonwood Springs and Vegas Ranch.

Hulsea algida Gray, Proc. Amer. Acad. vi. 547 (1865). Type locality, "high peaks of the Sierra Nevada, on Mount Dana, at 11,500 feet, and Wood's Peak, 10,500 feet."

Above timber-line in the Sierra Nevada (Nos. 1660, 2058).

Chænactis attenuata Gray, Proc. Amer. Acad. x. 73 (1874). Type locality, "Ehrenberg, Arizona."

This plant has not been reported since its original discovery, and unfortunately the only specimens that I could collect were dead winter plants of the preceding year's growth. These plants retained their involucral bracts and a few achenia and leaves, and upon these the identification is made. The characters of very short obtuse pappus scales, few receptacular bristles, and fewer-flowered heads, as well as narrower involucral bracts, distinguish this species nicely from *C. carphoclinia*. It was confounded in the field with that species, and, although supposed to be abundant in Death Valley, the plant observed so frequently there may have been *C. carphoclinia*. The specimens collected were from the mesa near Bennett Wells (No. 201).

Chænactis brachypappa Gray, Proc. Amer. Acad. viii. 390 (1873). Type locality, "in the Pahranagat Mountains, Nevada."

Johnson Cañon, Panamint Mountains (No. 532).

Chænactis carphoclinia Gray, Bot. Mex. Bound. 94 (1859). Type locality, "Gila and Colorado desert."

This is a Lower Sonoran species collected in the Vegas Wash (No. 411); in Surprise Cañon, Panamint Mountains (No. 702); near Keeler (No. 865); and in the valley of the Virgen, near St. Thomas, Utah (No. 1920). It is undoubtedly abundant throughout these parts of the desert.

Chænactis douglasii (Hook.) Fl. Bor. Amer. i. 316 (1834), under *Hymenopappus;* Hook. & Arn. Bot. Beech. 354 (1840–41). Type locality, "on the barren dry sandy grounds of the Columbia, from the 'Great Falls' to the Rocky Mountains."

At Soda Springs, on the North Fork of Kern River (No. 1599).

Chænactis macrantha Eaton, Bot. King Surv. 171 (1871). Type locality, "foothills of Western Nevada, 5,000 to 5,500 feet elevation."

Between Darwin and Keeler (No. 948).

Chænactis santolinoides Gray, Syn. Fl. i. pt. ii. 341 (1884)—Greene in herb. Type locality, "San Bernardino Mountains, above Bear Valley, S. E. California."

Frazier Mountain (No. 1207).

Chænactis stevioides Hook. & Arn. Bot. Beech. 353 (1840–41). Type locality, "Snake Country."

Near Lone Pine (No. 892).

Chænactis xantiana Gray, Proc. Amer. Acad. vi. 545 (1865). Type locality, "near Fort Tejon," California.

Near Crystal Spring, Coso Mountains (No. 921).

Orochænactis thysanocarpha[1] (Gray) Proc. Amer. Acad. xix. 30 (1884), under *Chænactis*. Type locality, "southern part of the Sierra Nevada, California, probably in Kern County, at 9,800 feet." PLATE X.

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[1] **Orochænactis** gen. nov.

Plant of the order Compositæ, annual, slender-branched from the base; leaves narrowly linear, entire, alternate or the lowest opposite; anthodia in glomerules terminating the branches, discoid; involucre of about 4 equal, herbaceous, dis-

Plant 10 cm. or less high, with a few divaricate branches exceeding the main axis, scantily cobwebby up to the inflorescence, becoming smooth in age; branches brown, slender, terete, with usually but one or two long internodes; cotyledons oblong, sessile, connate into a scarious cup; leaves scattered, involute-filiform, obtuse at the apex, 1 to 2.5 cm. long; anthodia 6 to 8 mm. high, in glomerules of 2 to 5, terminating the branches, each subtended by a leaf, rayless; involucre composed of 4 herbaceous, linear-oblong, obtuse, slightly concave, externally minutely glandular bracts; flowers 4, hermaphrodite, one-half longer than the involucre; pappus a deciduous coherent ring of 12 to 17 spatulate, erose-fimbriate, hyaline paleæ slightly thickened in the stalk and middle of the blade; corolla 3 to 4 mm. long, yellow, minutely glandular, proper tube about .5 mm. long, throat long, cylindrical, lobes 5, triangular-ovate, the one outermost in the anthodium longer than the others; stamens and stigmas in the fresh plant included; filaments nearly as broad as the anthers, abruptly contracted to a narrow neck at the apex; anthers merely sagittate at the base, the hyaline apical appendages obtuse; stigmas clothed on the back and sides with short, obtuse, gland-like hairs; achenia about 18-striate, dotted with minute sessile glands, black or at full maturity perhaps gray.

The plant grew abundantly in the well-drained granitic soil about Whitney Meadows (No. 1685), and in similar situations at Big Cottonwood Meadows (No. 2142). These stations, which appear to be typical ones, are in the belt of *Pinus murrayana* and *P. balfouriana*. A few specimens were seen in the belt of *Pinus jeffreyi*, along the Hockett Trail, near Soda Springs (No. 1607), but this station is below the customary range of the species. The type locality of the plant is probably a little farther south in the Sierra Nevada, but the station was not recorded.

Syntrichopappus fremontii Gray, Pac. R. Rep. iv. 106 (1857). Type locality, "somewhere between the Rocky Mountains and the Sierra Nevada."

On the Darwin Mesa (No. 793), and in Sarcobatus Flat, Nevada (No. 2141).

Eriophyllum ambiguum Gray, Proc. Amer. Acad. vi. 547 (1865), under *Lasthenia;* Gray, Proc. Amer. Acad. xix. 26 (1883). Type locality, "near Fort Tejon," California.

In our plant, the conical receptacle bears near its apex short, weak bristles that persist after the fully matured achenia have fallen. In removing the achenia, if they are not quite mature, the bristles are easily broken off and the receptacle appears smooth. The species was found in the Funeral Mountains, near Mesquite Spring (No. 325), and in Johnson (No. 533), Surprise, and Willow Creek cañons (No. 834), Panamint Mountains.

Eriophyllum cæspitosum Lindl. Bot. Reg. xiv. t. 1167 (1828)—Douglas MS. Type locality, "in North-west America, in abundance, from the sea to the valley of the Rocky Mountains."

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tinct, slightly concave bracts; flowers as many as the bracts, greenish yellow, hermaphrodite; corolla 5-toothed, the tooth outermost in the anthodium slightly longer than the others; stamens inserted at the base of the corolla; anthers sagittate, not caudate; stigma lobes linear, without appendage, obtuse, clothed with short, blunt hairs; achenia terete, striate, clavate-obovate; pappus of several obtuse, membranaceous, erose-fimbriate paleæ coherently deciduous.

The genus is allied to *Chænactis*, but differs in its few-flowered glomerulate heads, few-bracted involucre, coherent deciduous pappus, sessile anthodia, and habit, and from all the species of that genus save *C. cusickii* in its entire leaves. The generic name is derived from ὄρος, mountain, and *Chænactis*, the name of the most nearly related genus, reduced to five syllables; for the plant grows at high altitudes in the Sierra Nevada of California.

Tejon Mountains (No. 1184). In our specimens the leaves are ovate in outline, but laciniately cleft into lanceolate segments. The pappus scales are narrowly lanceolate, twice to thrice as long as the breadth of the achenium, and acute.

Eriophyllum confertiflorum (DC.) Prodr. v. 657 (1836), under *Bahia;* Gray, Proc. Amer. Acad. xix. 25 (1883). Type locality, "in Nova-California."

On the south slope of the San Bernardino Mountains (No. 40), and along the South Fork of Kern River (No. 1029).

Eriophyllum lanosum Gray, Pac. R. Rep. iv. 107 (1857), under *Burrielia;* Gray, Proc. Amer. Acad. xix. 25 (1883). Type locality, "gravelly hills near the Colorado of the West."

In the Vegas Wash (No. 420) and the valley of the Virgin River (No. 1915).

Eriophyllum pringlei Gray, Proc. Amer. Acad. xix. 25 (1883). Type locality, "on gravelly plains, from the Mohave Desert to Tucson, Arizona."

In Willow Creek Cañon, Panamint Mountains (No. 838), and in the Ralston Deser (No. 2000).

Eriophyllum wallacei Gray, in Torr. Pac. R. Rep. iv., 105 (1857), under *Bahia;* Gray, Proc. Amer. Acad. xix. 25 (1883). Type locality, "Teyunga, near Los Angeles, California."

In Vegas Valley, Nevada (No. 394), and near Lone Pine, California (No. 889).

Palafoxia linearis Cav. Ic. Pl. iii. 3 (1794), under *Ageratum;* Lag. Gen. Nov. 26 (1816). Type locality, "Nova-Hispania," *i. e.*, Mexico.

This plant was observed near Saratoga Springs; at Resting Springs; in the Vegas Wash; and between Keeler and Crystal Spring, Coso Mountains.

Rigiopappus leptocladus Gray, Proc. Amer. Acad. vi. 548 (1865). Type locality, "Dalles of the Columbia River, Oregon."

Between Kernville and Havilah (No. 1046).

Porophyllum gracile Benth. Bot. Sulph. 29 (1844). Type locality, "Bay of Magdalena," Lower California.

Vegas Valley, Nevada (No. 397). The anthodia in our plant are unusually long (15 mm.), in this respect resembling other specimens from Arizona, near the northern limit of the species. The type specimens are described as having involucres only 4 lines (8 mm.) long. Apparently no species of *Porophyllum* has been collected in Nevada heretofore.

Nicolletia occidentalis Gray in Frem. Second Rep. 316 (1845). Type locality "on the banks of the Mohahve river, growing in naked sands."

Near Indian Wells (No. 1009).

Helenium bigelovii Gray, Pac. R. Rep. iv. 107 (1857). Type locality, "swamps near Santa Rosa Creek, California."

Near Mineral King (No. 1459) and in Sequoia Park (No. 2098), both in the Sierra Nevada.

Helenium hoopesii Gray, Proc. Acad. Phil. 1863, 65 (1863). Type locality, "South Park and west of Pike's Peak," Colorado.

Near Mineral King (No. 1406).

Psathyrotes annua (Nutt.) Pl. Gamb. 179 (1848), under *Bulbostylis* (§ *Psathyrotus*); Gray, Pl. Wright. ii. 100 (1853). Type locality, "Rocky Mountains, near Santa Fé."

Near Lone Pine (No. 949).

Psathyrotes ramosissima (Torr.) in Emory, Rep. 145 (1848), under *Tetradymia;* Gray, Proc. Amer. Acad. vii. 363 (1868). Type locality, "hills bordering the Gila."

This species, so far as it was observed by the expedition, differs from *P. annua,* in addition to the published characters, in having the base of the stem suffrutescent, and persistent for at least one year. It was often seen in full flower in midwinter. The other species appears to be strictly an annual. The corollas of *P. ramosissima* are often purplish, showing in this respect the same variation as *P. annua.* The herbage has a strong odor similar to that of commercial varnish.

The plant was found at Lone Willow Tanks; in Long Valley; near Bennett Wells; in a cañon of the Funeral Mountains east of the latter point; in Furnace Creek Cañon (Nos. 213, 568); between Salt Wells and Saratoga Springs; at several points in the vicinity of the latter place; in Resting Springs Valley; at Ash Meadows; between Cottonwood Springs and Vegas Ranch; in the Vegas Wash; in the northern part of Vegas Valley; between Towner's and Ash Meadows; near Hot Springs, Panamint Valley; and about the mouth of Surprise Cañon.

Achillea millefolium L. Sp. Pl. ii. 899 (1753). Type locality European.

The yarrow occurred frequently as a weed on the west slope of the Sierra Nevada along our route between Walker and Tehachapi passes.

Anthemis cotula L. Sp. Pl. ii. 894 (1753). Type locality European.

This plant, the mayweed, was seen at several points along our route between Kernville and Tehachapi Pass, and specimens were collected near Visalia (No. 1258), but the species did not occur east of the Sierra Nevada in the desert.

Matricaria discoidea DC. Prodr. vi. 50 (1837). Type locality, "in California."

Near Havilah (No. 1070).

Cotula coronopifolia L. Sp. Pl. ii. 892 (1753). Type locality, "in Æthiopia," etc.

Near San Bernardino (No. 23).

Tanacetum canum Eaton, Bot. King Surv. 179 (1871). Type locality, "limestone rocks at the mouth of a cañon in the East Humboldt Mountains, Nevada; 6,500 feet elevation."

Above timber-line on Mount Whitney (No. 2057). The heads of this plant are usually described as only 4 mm. broad, but in our specimens they frequently reach 8 mm.

Artemisia californica Less. Linnæa, vi. 523 (1831). Type locality, "in California," near San Francisco.

At the southern base of the San Bernardino Mountains (Nos. 111, 124).

Artemisia dracunculoides Pursh, Fl. 742 (1814). Type locality, "in Upper Louisiana."

In the Cañada de las Uvas (No. 1212), and along the North Fork of Kern River (No. 1594).

Artemisia filifolia Torr. Ann. Lyc. N. Y. ii. 211 (1828). Type locality not given. The original specimens were collected by E. P. James in 1820 on Long's first expedition, and probably came from western Nebraska.

Near St. George, Utah, in the valley of the Santa Clara River (No. 1958). This station marks probably the extreme western limit of the species.

Artemisia ludoviciana Nutt. Gen. ii. 143 (1818). Type locality, "on the banks of the Mississippi, near St. Louis; also on the alluvial plains of the Missouri."

A variety of forms have been referred to this species. Our plant is 1 to 1.5 m. high, with leaves about 10 cm. long, the upper ones entire and lanceolate, the lower 3- to 5-cleft, all finely white-tomentose beneath, and green and only sparingly pubescent above. It is the common Californian form.

This *Artemisia*, which is not a characteristic desert species, was found along water courses in Willow Creek Cañon, Panamint Mountains; near Lone Pine; along Caliente Creek; and near Visalia (No. 1263).

Artemisia rothrockii Gray, Bot. Cal. i. 618 (1876). Type locality, "Sierras of Tulare Co., Olache Mountains and Monachy Meadows, at 8,000 to 9,300 feet."

In Whitney Meadows, Sierra Nevada (No. 1684). In our specimens the leaves are narrower than those of the type.

Artemisia spinescens Eaton in Wats. Bot. King Surv. 180 (1871). Type locality,[1] "Rocky Mountain plains, in arid deserts, towards the north sources of the Platte."

The plant was first described by Nuttall, under the name *Picrothamnus desertorum*, and afterwards referred by Eaton to its present genus. The original specific name could not be retained, as there is already an Asiatic *Artemisia desertorum*.

This shrub occurred in abundance at no point in the region traversed by the writer. It was found in Surprise Cañon (No. 614) and Mill Creek Cañon, Panamint Mountains; near Crystal Spring, Coso Mountains; and along the west shore of Owens Lake. At all these points it occurred near the line between the Upper and Lower Sonoran zones. Farther east and north it was found by Dr. Merriam in many localities, as follows: Deep Spring Valley; between Wild Rose Spring and Emigrant Cañon, Panamint Mountains; Fish Lake Valley; between Mount Magruder and Gold Mountain; Grapevine Cañon; Sarcobatus Flat; Oasis Valley; Emigrant Valley; Timpahute Valley; Pahranagat Valley; Desert Valley; and Meadow Creek Valley.

Artemisia tridentata Nutt. Trans. Amer. Phil. Soc. new ser. vii. 398 (1841). Type locality, "plains of the Oregon, and Lewis' River."

This shrub, the true sage brush, occurs in the Upper Sonoran and Transition zones throughout the mountains of the desert region. Dr. Merriam, in his report, has written a detailed account of its distribution. Along the western slope of the Sierra Nevada it was found in the Transition zone on Frazier Mountain, on the west slope of Tejon Pass, and near Mineral King.

Peucephyllum schottii Gray in Torr. Bot. Mex. Bound. 74 (1859). Type locality, "diluvial banks of the Colorado, in Sonora."

The pappus of this species, although invariably described as composed of capillary bristles, nearly always shows some of the larger bristles flattened, and in No. 207, Palmer, 1890, from Santa Rosalia, Lower California, these bristles, as has been pointed out,[2] are still further expanded into well-developed paleæ.

The shrub is a very handsome and interesting one, its vegetation (of a much more brilliant green than that of *Larrea*) and its rounded, symmetrical form making a very striking figure in the usually sombre vegetation of the desert. From the specimens of the early collections the plant was not definitely known to be a shrub. It has, however, a well-defined trunk, which frequently attains a diameter of 7.5 to 10 cm. In the Funeral Mountains the shrub seemed to attain its most perfect development. In a cañon on the west slope of this range, opposite Bennett Wells, Mr. Bailey and I used its dead trunks for firewood, and found them of excellent quality. In a great wash in the interior of the same range, on the 21st of February, Mr. Funston and I saw many large, beautiful specimens of the plant, one of them with a trunk that I estimate to have been 18 or 20 cm. thick at the base.

In addition to the localities mentioned, the plant occurred on the south slope of Browns Peak (No. 171); in Furnace Creek Cañon (Nos. 355, 457); in the south end of the Funeral Mountains, near Saratoga Springs, and in a cañon west of Amargosa;

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[1] Trans. Amer. Phil. Soc. new ser. vii. 417 (1841).

[2] Contr. Nat. Herb. i. 84 (1890).

on the mountain slope east of Resting Springs; in the Vegas Wash; in Johnson Cañon and the wash leading from it; in Surprise Cañon, Panamint Mountains; and in a cañon of the Inyo Mountains, near Swansea. Dr. Merriam reported it from the Muddy Mountains, Nevada.

Arnica chamissonis Less. Linnæa, vi. 238 (1831). Type locality, "in Unalaschca." Near Mineral King, Sierra Nevada (No. 1408).

Arnica foliosa incana Gray, Bot. Cal. i. 416 (1876). Type locality Californian. Near Whitney Meadows, Sierra Nevada (No. 1638).

Raillardella argentea Gray, Proc. Amer. Acad. vi. 550 (1865), under *Raillardia;* Gray, Bot. Cal. i. 417 (1876). Type localities, "Sonora Pass 8,000—10,000 feet, and Ebbett's Pass, at about the same altitude," both in the Sierra Nevada, California.

Near Mineral King (No. 1544).

Raillardella scaposa eiseni Gray, Syn. Fl. i. pt. ii. 380 (1884). Type locality, "mountains of King's River, Fresno Co.," California.

With the preceding (No. 1545).

Senecio aureus L. Sp. Pl. ii. 870 (1753). Type locality, "in Virginia, Canada." Near Whitney Meadows (No. 1708).

Senecio canus Hook. Fl. Bor. Amer. i. 333 (1834). Type locality, "banks of the Saskatchawan."

Near Whitney Meadows (No. 1647). Our specimens, like some others from the high Sierra Nevada of California, differ from the type form in their broader, always entire leaves more abruptly contracted at the base, and in their stoloniferous instead of tufted habit.

Senecio douglasii DC. Prodr. vi. 429 (1837). Type locality, "in California." The original specimens were collected by Douglas.

Observed between Martin's and Crowder's ranches on the south slope of Cajon Pass (No. 122); on the mountain slope west of Lone Willow Tanks; in a cañon of the Funeral Mountains west of Amargosa; between Cottonwood Springs and Vegas Valley; in Surprise and Willow Creek cañons, Panamint Mountains; in a cañon of the Inyo Mountains, near Swansea; between Lone Pine and Olancha; on both slopes of Walker Pass; and along the road between Kernville and Caliente. The plant appears to belong to the upper part of the Lower Sonoran zone, transgressing to some extent upon the Upper Sonoran.

Senecio eurycephalus Torr. & Gr. in Gray, Pl. Fendl. 109 (1849). Type locality, "California."

Near Tehachapi (No. 1122).

Senecio fremontii occidentalis Gray, Bot. Cal. i. 618 (1876). Type locality, "Sierra Nevada, on Mount Whitney at 12,000 feet, and S. Fork of Kern River down to 9,800 feet."

Near Whitney Meadows (No. 1648).

Senecio lugens Richards. Bot. App. 748 (1823). Type locality, "at Bloody Fall, where the Esquimaux were destroyed by the Northern Indians that accompanied Hearne, whence the specific name." Bloody Fall is on the Coppermine River a few miles above its mouth, and within the Arctic Circle.

In the high Sierra Nevada (Nos. 1491, 1651). No. 1651 has smaller heads than No. 1491, with purple-tipped involucral bracts and slenderer, smoother, serrate leaves. It is the same as No. 5063, Bolander, 1866, which came from an altitude of 9,700 feet in the Sierra Nevada, at the headwaters of Tuolumne River, and which Eaton[1] referred to *S. lugens hookeri*. This variety was afterwards included by Gray in the type form of *S. lugens*.

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[1] Bot. King Surv. 188 (1871).

Senecio mohavensis Gray, Syn. Fl. i. pt. ii. 454 (1884). Type locality, "S. E. California in the Mohave region, near the Colorado."

Hall Cañon, Panamint Mountains (No. 697).

Senecio serra Hook. Fl. Bor. Amer. i. 333 (1834). Type locality, "on the banks of the Wallawallah, Flathead, and Spokan Rivers."

Near Mineral King (No. 1466).

Senecio triangularis Hook. Fl. Bor. Amer. i. 332 (1834). Type locality, "moist prairies among the Rocky Mountains."

In the valley of Kaweah River (No. 1330).

Senecio werneriæfolius Gray, Proc. Acad. Phila. 1863, 68 (1863), as *S. aureus werneriæfolius*; Gray, Proc. Amer. Acad. xix. 54 (1883). Type locality, "the Rocky Mountains, in Colorado Territory."

In the high Sierra Nevada (Nos. 1662, 2052).

Lepidospartum squamatum Gray, Proc. Amer. Acad. viii. 290 (1870), under *Linosyris*; Gray, Proc. Amer. Acad. xix. 50 (1883). Type locality, "low hills of the Sierra Santa Monica, Los Angeles Co., California."

The distribution of this shrub is singular. As seen by the expedition, it occurred along the southern and western border of the Mohave Desert, entering it along certain sandy, dry washes and extending into the intramontane region in similar situations. It was found in the bed of Lytle Creek, near San Bernardino (No. 18); along the Mohave River at Daggett; in dry washes at the eastern base of the southern Sierra Nevada, near Indian Wells and Walker Pass; at several points along our route from Walker Pass to Tehachapi, by way of Kernville, Havilah, and Caliente; and near the mouth of Tehachapi Cañon.

Lepidospartum striatum Coville, Proc. Biol. Soc. Wash. vii. 73 (1892). Type locality as given below. PLATE XI.

"Shrub 1 to 1.6 meters high, with a stout erect trunk; branches numerous, erect, striate-angled by 3 ribs decurrent from each leaf-base, closely white-tomentose, the ribs resiniferous and glabrous; leaves alternate, filiform-linear, thicker above, acute, slightly spreading, 20 to 25 mm. long, or the upper only 10 mm.; heads 2 to 5 at the apex of the branch, singly sessile, or very short-peduncled, in the axils of leaf-like bracts, 12 to 16 mm. long; involucre oblong to narrowly oblong, 7 to 10 mm. high; bracts about 9, broadly ovate to narrowly oblong, obtuse, stiff, coriaceous, with narrow membranaceous margin, lanate on the back, imbricated, the outer successively shorter; flowers 5; corolla lobes linear-lanceolate, acute, longer than the throat, with marginal nerves and an oblong or linear resin duct at the apex; anthers acutely sagittate at the base; anther-tips obtuse; styles 2 to 2.5 mm. long, linear, bluntly acute, but short-hairy so as to appear obtuse; achenium densely villous with spreading long white hairs; pappus copious, white, of conspicuously scabrous soft bristles.

"This plant has the general appearance of a *Tetradymia*, but the involucre and style-tips of *Lepidospartum*. The branches resemble those of *T. glabrata*, except that the decurrent leaf-base is made up of three slender ribs instead of one broad line. The leaves, too, are very similar to the primary ones of that species. The involucral bracts are thoroughly imbricated, and in this respect are quite different from those of any *Tetradymia*; yet their texture and pubescence are the same. The pappus and achenia closely resemble those of *T. glabrata* and *T. canescens inermis*. The median nerve of the corolla lobes in *Tetradymia* and in *Lepidospartum squamatum*, which are really resin ducts, are here reduced to large linear or oblong apical resin glands not produced to the base of the lobe. The anther tip is really acute, but from the hairs about it appears obtuse, and somewhat resembles that of *Tetradymia.* The plant forcibly suggests the reuniting of *Lepidospartum* with *Tetradymia,* as a subgenus, a position in which Dr. Gray once placed it, but the involucres of the two genera are of quite different types.

"Type specimen in the United States National Herbarium, No. 558, Shockley, 1888; collected in August, 1888, in Soda Springs Cañon, Esmeralda County, Nevada, by W. H. Shockley."

Specimens were collected in the Charleston Mountains, near Clark's sawmill (No. 309).

Tetradymia canescens DC. Prodr. vi. 440 (1837). Type locality, "in Americæ borealis ora occidentali ad Columbia river."

The *Tetradymia canescens* of the Rocky Mountain region is all referable to *T. canescens inermis,* the type locality of which is "on the dry barren plains of the Rocky Mountains. Common particularly near Lewis River of the Shoshonee, but not in the plains of Oregon." Our No. 1601 differs from this in its larger leaves, longer involucres (9 to 11 mm.) and flowers, and crucially in its glabrous achenia. In *T. canescens inermis* the involucral scales are 5.5 to 7 mm. long. No. 6144, Bolander, 1866, from "Mono Lake," and No. 681, King Survey, from Virginia Mountains, Nevada, alt. 6,000 feet, are the same as our plant. Those plants were referred by Gray to the type form of the species. I have been unable to see the type specimen of it. Nos. 785 and 2007 are fragmentary winter specimens, doubtfully referable here, perhaps belonging to *T. canescens inermis.* The former was collected on Mount Magruder, Nevada, the latter on the Panamint Mountains, near the head of Willow Creek. The same plant was seen on the crest of the Panamints, north of Johnson Cañon, at an altitude of 3,000 meters. No. 1601 was collected on the North Fork of Kern River, near Soda Springs, in the belt of *Pinus jeffreyi.*

Tetradymia comosa Gray, Proc. Amer. Acad. xii. 60 (1876). Type locality, "W. Nevada," "S. E. borders of California," "Potrero, San Diego Co.," California.

Observed on the first divide north of Daggett, on the road to Lone Willow Spring; on the northeast slope of Lone Willow Peak; at the summit station between Searles's and Mohave; in Mill Creek Cañon, Panamint Mountains; near Crystal Spring, Coso Mountains; at several points between Lone Pine and Indian Wells; and on both slopes of Walker Pass. The plant occupies in this region the upper altitudes of the Lower Sonoran zone. Some of the localities recorded may belong to *T. stenolepis.*

Tetradymia glabrata Gray, Pac. R. Rep. ii. pt. ii. 122 (1855). Type locality, "on the Sierra Nevada," California.

This plant occurred sparingly about the summit station on the road from Searles's to Mohave and abundantly in the desert plains about Lone Pine. Specimens were collected by Mr. Bailey near Panaca, Nevada (No. 1978), and in Sarcobatus Flat, Ralston Desert (No. 2001). Dr. Merriam reported it also in Nevada, between Gold Mountain and Mount Magruder, in Grapevine Cañon, Sarcobatus Flat, and Oasis, Emigrant, Timpahute, Pahranagat, Desert, and Meadow Creek valleys. The plant belongs to the upper part of the Lower Sonoran zone.

Tetradymia spinosa Hook. & Arn. Bot. Beech. 360 (1840-41). Type locality, "Snake Country," Idaho.

This species was found on the Beaverdam Mountains, Utah (No. 1949); on the western slope of the Charleston Mountains, along the roads to Clark's sawmill and to Mountain Springs; near Cottonwood Springs, Vegas Valley; in Johnson and Willow Creek cañons, Panamint Mountains; near Crystal Spring, Coso Mountains (No. 930); and on both slopes of Walker Pass. It is a shrub characteristic of the upper portion of the Lower Sonoran zone. Dr. Merriam reported it also in Deep Spring Valley, California; in Gold Mountain, the Highland Range, and in Oasis, Emigrant, Timpahute, and Pahranagat valleys, Nevada; and the Beaverdam Mountains, Utah.

Tetradymia stenolepis Greene, Bull. Cal. Acad. i. 92 (1885). Type locality, "mountains of Kern Co., California."

Observed in Tehachapi and Antelope valleys, but not distinguished at the time from *T. comosa.*

Carduus andersonii (Gray) Proc. Amer. Acad. x. 44 (1874), under *Cnicus;* Greene, Proc. Acad. Phila. 1892, 362 (1893). Type locality, "Sierra Nevada, California, and adjacent part of Nevada."

Near Farewell Gap, Sierra Nevada (No. 1740).

Carduus californicus (Gray) Pac. R. Rep. iv. 112 (1857), under *Cirsium;* Greene, Proc. Acad. Phila. 1892, 359 (1893). Type locality, "hill-sides, near Knight's Ferry, on the Stanislaus, California."

Near Caliente (No. 1102).

Carduus drummondii (Torr. & Gr.) Fl. ii. 459 (1843) under *Cirsium.* Type locality, "banks of Saskatchawan and prairies of the Rocky Mountains."

Tejon Cañon (No. 1228).

Carduus drummondii acaulescens (Gray) Proc. Amer. Acad. x. 40 (1874), under *Cnicus.* Type locality, "Rocky Mountains, and sparingly in the Sierra Nevada of California."

Near Whitney Meadows (No. 1714).

Carduus ochrocentrus (Gray) Pl. Fendl. 110 (1849), under *Cirsium;* Greene, Proc. Acad. Phila. 1892, 363 (1893). Type locality, "mountain-sides, around Santa Fé," New Mexico.

Specimens were collected only in Furnace Creek Cañon (No. 220), and in Grapevine Mountain (No. 1755), but the species is undoubtedly of frequent occurrence in the desert region.

Carduus occidentalis Nutt. Trans. Amer. Phil. Soc. new ser. vii. 418 (1841). Type locality, "round St. Barbara," California.

Near Caliente (No. 1105).

Centaurea melitensis L. Sp. Pl. ii. 917 (1753). Type locality, the island of Melita, Mediterranean Sea.

East of the Sierra Nevada this plant was seen at two places, growing as an introduced weed: at a camping place in the lower part of Surprise Cañon (No. 708), and in Willow Creek Cañon, Panamint Mountains.

Uropappus linearifolius (DC.) Prodr. vii. 85 (1839), under *Calais;* Nutt. Trans. Amer. Phil. Soc. new ser. vii. 425 (1841). Type locality, "in California et circa Fort-Vancouver."

In Johnson (No. 556) and Surprise (No. 627) cañons, Panamint Mountains.

Ptilocalais nutans (Hook.) Lond. Journ. Bot. vi. 253 (1847), under *Scorzonella;* Greene, Bull. Cal. Acad. ii. 54 (1886). Type locality, "dry sunny loamy declivities of Spokan and Cœur d'Aleine mountains."

Near Mammoth, Mono County, California (No. 1825).

Atrichoseris platyphylla Gray, Proc. Amer. Acad. ix. 214 (1874), under *Malacothrix;* Gray, Syn. Fl. i. pt. ii. 410 (1884). Type locality, "S. E. California, in gravelly soil near Fort Mohave." Fort Mohave is not in California, but east of the Colorado, in Arizona.

This plant was noted as growing at the western foot of the Funeral Mountains, opposite Bennett Wells; Furnace Creek Cañon (Nos. 230, 451, 576); dry valley of the Amagosa River, from Salt Wells to Saratoga Springs; bank of the Colorado River, at the mouth of Vegas Wash; valley of the Virgin River, near St. Thomas, Nevada (No.

1916); mesa between Bennett Wells and the mouth of Johnson Cañon; near Hot Springs, Panamint Valley; in Surprise Cañon, near its mouth; and in Boundary Cañon, Grapevine Mountains (No. 975). It is an annual, confined to the Lower Sonoran zone, rarely reaching a greater altitude than 1,000 meters, and growing abundantly on some of the most arid of gravelly mesas and washes.

Crepis intermedia Gray, Syn. Fl. i. pt. ii. 432 (1884). Type locality not given; range, "Rocky Mountains in Colorado to the Sierra Nevada, California, and north to the interior of Washington Terr. and borders of British Columbia."

Willow Creek Cañon, Panamint Mountains (No. 839).

Crepis intermedia pleurocarpa Gray, Syn. Fl. i. pt. ii. 432 (1884). Type locality, "mountains about headwaters of the Sacramento, N. California."

Near Mineral King, Sierra Nevada (No. 1394).

Crepis nana Richards. Bot. App. 746 (1823). Type locality, "on the Copper-Mine River."

Farewell Gap, Sierra Nevada (Nos. 1575, 1748). The mature heads in our plants are but 9 mm. in length, shorter than is usual in the American plant.

Hieracium albiflorum Hook. Fl. Bor. Amer. i. 298 (1834). Type locality, "alpine woods in the Rocky Mountains, north of the Smoking River, in lat. 56°."

Valley of Kaweah River (No. 1374).

Hieracium horridum Fries, Epicr. Hier. 154 (1862). Type locality, "in montibus Californiæ."

Near Mineral King, Sierra Nevada (No. 1514).

Malacothrix altissima Greene, Bull. Cal. Acad. i. 195 (1885). Type locality, "mountains of Kern County [California], near Tehachapi Station."

Near Fort Tejon (No. 1158). Determined by E. L. Greene.

Malacothrix coulteri Gray, Pl. Fendl. 113 (1849). Type locality, "California." The original specimens were collected by Coulter.

Near Crystal Spring, Coso Mountains (No. 940).

Malacothrix glabrata (Eaton) Bot. King Surv. 201 (1871), as *M. californica glabrata*—Gray MS.; Gray, Syn. Fl. i. pt. ii. 422 (1884). Type locality, "Carson City," Nevada, and "foothills of the Trinity Mountains, Nevada; 4,500 feet elevation."

Near Bennett Wells (No. 478), in Surprise Cañon (No. 604), and near Hot Springs (No. 727).

Malacothrix sonchoides Nutt. Trans. Amer. Phil. Soc. new ser. vii. 439 (1841), under *Leptoseris;* Torr. & Gr. Fl. ii. 486 (1843). Type locality, "the plains of the Platte."

Near Keeler (No. 848).

Anisocoma acaulis Gray, Bost. Journ. Nat. Hist. v. 111 (1845). Type locality not given. The original specimens were collected by Fremont, undoubtedly in the Mohave Desert region.

The achenia in our specimens are often 14-nerved. This is a beautiful plant in all its parts and deserves a trial in cultivation. It may be noted here that the generic name is feminine and the specific name should read *acaulis,* as originally published, not "*acaule,*" as in the Botany of California and the Synoptical Flora; and that the genus and species were published by Gray, not by Torrey and Gray.

This beautiful annual was seen but sparingly, occurring in the upper part of the Lower Sonoran zone. It was found only in Willow Creek Cañon, Panamint Mountains (No. 749), and near Crystal Spring, Coso Mountains.

Agoseris grandiflora (Nutt.) Trans. Amer. Phil. Soc. new ser. vii. 432 (1841), under *Stylopappus;* Greene, Pittonia, ii. 178 (1891). Type locality, "high plains of the Wahlamet," i. e., the Willamette River, in Oregon.

Valley of Kaweah River (No. 1356).

Agoseris retrorsa (Benth.) Pl. Hartw. 320 (1849), under *Macrorhynchus;* Greene, Pittonia, ii. 178 (1891). Type locality, "in montibus Sacramento."

Near Mineral King, Sierra Nevada (No. 1393).

Calycoseris parryi Gray, Bot. Mex. Bound. 106 (1859). Type locality, "mountains east of Monterey, California."

In Johnson Cañon, Panamint Mountains (No. 529), and Shepherd Cañon, Argus Mountains (No. 731).

Calycoseris wrightii Gray, Pl. Wright. ii. 104 (1853). Type locality, "stony hills around El Paso," Texas.

In Johnson (No. 592) and Surprise (No. 603) cañons, Panamint Mountains. The heads of this species are described as rose-colored, but in our specimens the back of the ligule, in the dry plant, is of a maroon color, while the inner surface is yellow. The achenia are not yet mature. Our plant is identical with those collected by Edward Palmer in southern Utah, in 1870, and referred here by Gray.

Glyptopleura setulosa Gray, Proc. Amer. Acad. ix. 211 (1874). Type locality, "near St. George, on the southern border of Utah."

In the Ralston Desert, Nevada (No. 1999).

Sonchus asper (L.) Sp. Pl. ii. 794 (1753), as *S. oleraceus asper;* All. Fl. Ped. i. 222 (1785). Type locality European.

Scattered plants of this weed, the sow thistle, occurred at Furnace Creek Ranch; in Johnson (No. 551), Surprise, and Willow Creek cañons, Panamint Mountains, and in Tehachapi Valley.

Lygodesmia exigua Gray, Pl. Wright. ii. 105 (1853), under *Prenanthes;* Gray, Proc. Amer. Acad. ix. 217 (1874). Type locality, "stony hills above El Paso," Texas.

Bentham and Hooker were the first to point out[1] that this plant was apparently a *Lygodesmia.*

It was found in Surprise and Mill Creek cañons, Panamint Mountains; at the mouth of Hall Cañon, in the same range (No. 667); and near Swansea, Owens Valley.

Ptiloria exigua (Nutt.) Trans. Amer. Phil. Soc. new ser. vii. 428 (1841), under *Stephanomeria;* Greene, Pittonia, ii. 132 (1890). Type locality, "on the Rocky Mountain plains, towards the Colorado."

Collected only in the San Bernardino Valley (No. 38). A *Ptiloria* supposed to be *P. exigua* was seen throughout the desert, more commonly in the upper altitudes of the Lower Sonoran zone.

Ptiloria parryi (Gray) Proc. Amer. Acad. xix. 61 (1883), under *Stephanomeria.* Type locality,[2] "near St. George, S. Utah."

Mill Creek cañon, Panamint Mountains (No. 755).

Ptiloria pentachæta (Eaton) Bot. King Surv. 199 (1871), under *Stephanomeria;* Greene, Pittonia, ii. 133 (1890). Type locality, "Truckee and Humboldt Valleys [Nevada]; 4,500 feet elevation."

In Cottonwood cañon, Panamint mountains (No. 967), and in the Ralston Desert, Nevada (No. 1998). The bristly teeth on the basal portion of the pappus-bristles in this species and *S. exigua*[3] show the rudiments or the remnants of accessory bristles such as are fully developed in *Chætadelpha wheeleri.*[4]

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[1] Gen. Pl. ii. 530 (1873).

[2] Gray, Syn. Fl. i. pt. ii. 413 (1884).

[3] Both illustrated in Bot. King Surv. pl. xx. (1871).

[4] Illustrated in Bot. Wheeler Surv. pl. xv. (1878).

Ptiloria tenuifolia (Torr.) Ann. Lyc. N. Y. ii. 210 (1828), under *Prenanthes*; Raf. Atl. Journ. 145 (1832). Type locality, "near the Rocky Mountains."

Near Farewell Gap, Sierra Nevada (No. 1741). This is *Stephanomeria minor* (Hook.) Nutt.

Nemoseris neomexicana (Gray) Pl. Wright. ii. 103 (1853), under *Rafinesquia*; Greene, Pittonia, ii. 193 (1891). Type locality, "stony hills along the Rio Grande near El Paso, Texas."

In Surprise (No. 605) and Hall (No. 730) cañons, Panamint Mountains.

LOBELIACEÆ.

Nemacladus ramosissimus Nutt. Trans. Amer. Phil. Soc. new ser. viii. 254 (1841–43). Type locality, "in sandy soils, near St. Diego, Upper California."

This was observed in Death Valley, about 6 kilometers southeast of Salt Wells; in the southern part of the Funeral Mountains, near Saratoga Springs; about the mouth of Hall Cañon (No. 677) and of Willow Creek Cañon (No. 811), Panamint Mountains; and on the bank of the Kaweah River at Three Rivers, Tulare County, California (No. 1296).

CAMPANULACEÆ.

Campanula prenanthoides Durand, Pl. Pratt. 93 (1855). Type locality, "on Deer Creek, one of the affluents of the Sacramento river, California."

Near Yosemite (No. 1854).

Heterocodon rariflorum Nutt. Trans. Amer. Phil. Soc. new ser. viii. 255 (1841–43). Type locality, "grassy plains of the Wahlamet and Oregon."

Near Three Rivers (No. 1293).

ERICACEÆ.

Vaccinium cespitosum Mx. Fl. i. 234 (1803). Type locality, "in borealibus Americæ, præsertim circa sinum Hudsonis."

In the high Sierra Nevada (Nos. 1507, 1552). The specimens are at most but 5 cm. high and have their leaves glaucous and thicker than in the type form.

Arctostaphylos glauca Lindl. Bot. Reg. xxi. under t. 1791 (1835). Type locality, "California."

Near Fort Tejon (No. 1161), and on the south slope of the San Bernardino Mountains (No. 119).

Arctostaphylos manzanita Parry, Bull. Cal. Acad. ii. 491 (1887). Type locality not given, but Californian.

A characteristic shrub of the upper altitudes of the chaparral belt in the valley of the Kaweah River (No. 1751). The scant material collected renders the identification uncertain.

Arctostaphylos nevadensis Gray, Syn. Fl. ii. pt. i. 27 (1878). Type locality, "Sierra Nevada, California, common at 8,000–10,000 feet."

Near Mineral King, Sierra Nevada (No. 1419).

Arctostaphylos parryana Lemmon, Pittonia, ii. 68 (1890). Type locality, "on the Tehachapi Mountains of south-central California, 4 miles west of Keene Station."

In the mountains south of Fort Tejon, growing at the lower edge of the chaparral (No. 1195). It has not been previously reported since its original discovery.

Arctostaphylos pungens H. B. K. Nov. Gen. & Sp. iii. 278 (1818). Type locality, "in Regno Mexicano, locis alsis, juxta Moran et Villalpando, alt. 1,300–1,400 hex."

Collected in the Charleston Mountains, Nevada, near Clark's sawmill (No. 312), among the yellow pines, and at Mountain Springs, in the piñon belt (No. 1879). Dr. Merriam found it on the eastern slope of the Beaverdam Mountains, Utah. This species of manzanita, which agrees in all respects with the true *A. pungens* of Mexico, seems to be confined in the United States to some of the desert mountains east of the Sierra Nevada. If a subsequent collection of data shows this to be true, the distribution of the species will correspond with that of many others which extend from the mountains of Mexico northward into the desert and Great Basin mountains of the United States, in a zone higher than that of the true desert vegetation.

Bryanthus breweri Gray, Proc. Amer. Acad. vii. 367 (1868). Type localities, "high sierras of California, alt. 10,000 feet; on Wood's Peak, El Dorado Co.; near Donner's Pass; and Mariposa Co.; also Mt. Hoffman."

Near timber-line in the Sierra Nevada (Nos. 1555, 1829, 2089).

Kalmia glauca microphylla Hook. Fl. Bor. Amer. ii. 41 (1834). Type locality, "swamps in the Rocky Mountains."

This variety of *Kalmia glauca* has a well-defined range distinct from that of the type form, yet it is difficult of clear characterization in words. In general it is a lower, smaller plant than the type, with oval leaves, commonly 10 to 15 mm. long, and only 2 to 6 flowers in each cluster. It is known to occur on the highest peaks of California, Nevada, Oregon, Colorado, Yellowstone Park, and Idaho. The type form does not occur in this central elevated region, but it extends on the west coast from Alaska south at least as far as Puget Sound, and on the eastern side of the continent to New England and Pennsylvania.

Specimens were collected near timber-line in the vicinity of Mineral King (No. 1554).

Ledum glandulosum Nutt. Trans. Amer. Phil. Soc. new. ser. viii. 270 (1841–43). Type locality, "in the central chain of the Rocky Mountains, on the sides of the mountains which close up Thornberg's ravine."

In the high Sierra Nevada (Nos. 1556, 1700).

Azalea occidentalis Hook. Bot. Mag. lxxxiii. t. 5005 (1857)—Torr. & Gr. MS. Type locality not specifically given. "Our drawing was made from a beautiful specimen sent by the Messrs. Veitch, * * * which was raised from seeds sent direct from California by Wm. Lobb." The Whipple Survey specimen came from "Laguna de Santa Rosa [California], in low and wet ravines."

On the western slope of the Sierra Nevada (Nos. 1360, 1841).

Pyrola picta Smith in Rees, Cycl. xxix. (1819). Type locality, "on the west coast of North America."

Sequoia Park (No. 2100).

Pyrola rotundifolia L. Sp. Pl. i. 396 (1753). Type locality, "in Europa septentorionaliore, Virginia, Brasilia."

Near Whitney Meadows (No. 1699). Our plant is a large form with thin, orbicular leaves 3 to 6 cm. broad.

MONOTROPACEÆ.

Pterospora andromedea Nutt. Gen. i. 269 (1818). Type locality, "in Upper Canada, near the Falls of Niagara."

Near Mineral King (No. 1377).

Sarcodes sanguinea Torr. Pl. Frem. 18 (1853). Type locality, "valley of the Sacramento; the precise locality not recorded, but probably on the Yuba River."

In the yellow and black pine forests of the Sierra Nevada (Nos. 1365, 1843, 2101). A careful examination of the underground portion of this plant showed that it has no connection with the roots of any other plant, and that it is undoubtedly a saprophyte. Its underground parts form an interlocking brittle mass often 10 to 12 centimeters in diameter.

Allotropa virgata Torr. & Gr. in Gray, Pac. R. Rep. vi. pt. iii. 80 (1857). Type locality, "on the Cascade Mountains of northern Oregon."

Near Mineral King, Sierra Nevada (No. 1516). In the reference cited above, the species is named, without description, as the only one belonging to the genus, and a diagnosis of the genus is given on the following page.

Pleuricospora fimbriolata Gray, Proc. Amer. Acad. vii. 369 (1868). Type locality, "in or near the Mariposa *Sequoia gigantea* Grove," California.

Valley of the Kaweah River (No. 1363). This is the southernmost known station of this exceedingly rare plant. In our specimens the petals are one-third longer than the sepals, and the scales on the stem overlap only at its base.

LENNOACEÆ.

Pholisma arenarium Nutt. in Hook. Ic. Pl. vii. t. 626 (1844). Type localities, "Monterey and St. Diego, California."

Between Indian Wells and Haway Meadows (No. 841), and on the eastern slope of Walker Pass (Nos. 1016, 2046).

PLUMBAGINACEÆ.

Statice limonium californica (Boiss.) in DC. Prodr. xii. 643 (1848), as *S. californica;* Gray, Bot. Cal. i. 466 (1876). Type locality, "in California ad San Francisco, ad Santa Clara."

This plant, the sea lavender, was seen only in the marshes in the upper part of the Vegas Wash, Nevada, where it occurred abundantly.

PRIMULACEÆ.

Primula suffrutescens Gray, Proc. Amer. Acad. vii. 371 (1868). Type locality, "Sierra Nevada, on Silver Mountain, alt. 10,500, near the snow."

Above timber-line on the mountains north of Whitney Meadows (No. 1663).

Dodecatheon jeffreyi Moore in Van Houtte, Fl. des Serres, xvi. 99 (1867). Description based on specimens cultivated at Dublin, from Rocky Mountain seed.

In the high Sierra Nevada (Nos. 1458, 2124), and in the White Mountains (No. 1812).

OLEACEÆ.

Menodora spinescens Gray, Proc. Amer. Acad. vii. 388 (1868). Type locality, "cañons and hillsides, southeastern part of the State of Nevada."

This plant, reported heretofore only from the type locality and from the Providence Mountains, San Bernardino County, California, is of frequent occurrence in the Death Valley region. It was found on the north slope of Lone Willow Peak; on the western foot-slopes of the Charleston Mountains, both along the road to Clark's sawmill and near Yount's ranch; in Vegas Valley, east of Cottonwood Springs, and north of Corn Creek; on the summit and both slopes of the divide northwest of Towner's; on the divide between Ash Meadows and Pahrump; between Ash Meadows and Furnace Creek (No. 458); and between Keeler and Crystal Spring. It is a low, intricately branched shrub, commonly from 15 to 30, rarely 70 or 80, cm.

high. Dr. Merriam has reported it also from Deep Spring Valley, California, and from Fish Lake Valley, Gold Mountain, Oasis, Indian Spring, Timpahute, and Pahranagat valleys, Nevada.

Fraxinus anomala Wats. Bot. King Surv. 283 (1871)—Torr. in herb. Type locality, "first discovered by Newberry on Macomb's expedition in 1859 in Labyrinth Cañon on the Colorado River, Utah."

This peculiar, simple-leafed ash has been collected heretofore only in southern Utah and in southern Colorado. It was found by the expedition on the west slope of the Charleston Mountains, both on the road to Clark's sawmill (No. 379) and near Mountain Springs, and on the eastern slope of the Beaverdam Mountains, Utah (No. 1948).

Fraxinus coriacea Wats. Amer. Nat. vii. 302 (1873). Type localities, "Ash Meadows, Nevada, and Devil's Run Cañon, Arizona."

This ash appears not to have been reported from the State of California before, but it is known in the Lower Sonoran region of southern Utah, southern Nevada, and Arizona. It was collected along Cottonwood Creek, on the west shore of Owens Lake (No. 998), and at Ash Meadows, Nevada (No. 2146), one of the type localities.

Fraxinus dipetala Hook. & Arn. Bot. Beech. 362 (1840–41). Type locality not given. The original specimens were collected in California by Douglas.

Valley of Kaweah River (No. 1300).

Fraxinus oregona Nutt. Sylv. iii. 59 (1842–53). Type locality, "in the Oregon territory." "We never saw it above the first falls of the Oregon."

With the last (No. 1303).

Fraxinus pistaciæfolia Torr. Pac. R. Rep., iv. 128 (1857). Type locality, "rocky ravines of Williams' River," northwestern Arizona.

This species of the ash appears not to have been reported from California before. It is certainly quite distinct from *F. coriacea* and, where we found it, grew among the piñons in the Upper Sonoran zone. The type specimens also were collected in the same zone, for Lieut. Whipple in his itinerary states[1] of their camp on January 3, 1854, the day on which the specimens were collected, "We now seem to be below the region of pines, and of the sweet-berried cedars. Red cedar is, however, abundant; larger and finer than before seen. There are also numerous piñons with esculent nuts, affording food for wild beasts as well as for Indians."

Specimens were collected in Death Valley Cañon, Panamint Mountains (No. 2017).

Adelia parvifolia (Gray) Proc. Amer. Acad. iv. 364 (1859), as *Forestiera acuminata parvifolia*. Type locality, "New Mexico; near Santa Fé."

This is the *Forestiera neomexicana* of Gray's Synoptical Flora. It is an interesting shrub and was seen very sparingly, first in Willow Creek Cañon, Panamint Mountains (No. 829), at about the upper limit of *Larrea*, and afterwards on the west side of Owens Lake (No. 1001) in the dry wash of a stream descending from the Sierra Nevada; in Tehachapi Cañon, near Cameron; and at Willow Spring in Antelope Valley. These points are all either a little above or a little below the line between the Upper and Lower Sonoran zones.

APOCYNACEÆ.

Amsonia brevifolia Gray, Proc. Amer. Acad. xii. 64 (1877). Type locality, "S. Utah and W. Arizona, to the border of California."

Willow Creek Cañon, Panamint Mountains (No. 825).

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[1] Pac. R. Rep. iii. pt. i. 86 (1856).

Apocynum androsæmifolium L. Sp. Pl. i. 213 (1753). Type locality, "in Virginia, Canada."

Near Mineral King, Sierra Nevada (No. 1442). In the place cited above, the specific name of this plant was given "*fol. androsæmi*," but in a subsequent edition of the Species Plantarum the name was written as ordinarily quoted.

Apocynum cannabinum L. Sp. Pl. i. 213 (1753). Type locality, "in Canada, Virginia."

The Indian hemp was seen about the Eagle Borax Works, Death Valley; in Cottonwood Cañon, Panamint Mountains (No. 972); at Winters's ranch, Pahrump Valley, Nevada; and at Ash Meadows. It confines itself to marshes, at Ash Meadows and Winters's ranch growing in great abundance. It is often used by the Indians as a fiber for making cords and nets.

ASCLEPIADACEÆ.

Philibertia linearis hirtella Gray, Bot. Cal. i. 478 (1876), as *Sarcostemma heterophyllum hirtellum;* Gray, Syn. Fl. ii. pt. i. 88 (1878). Type locality, "near Fort Mohave," Arizona.

Willow Creek Cañon, Panamint Mountains (No. 817).

Gomphocarpus cordifolius (Benth.) Pl. Hartw. 323 (1849), under *Acerates;* Gray, Bot. Cal. i. 477 (1876). Type locality, "in valle Sacramento."

Near Trout Meadows, Sierra Nevada (No. 1730), in forests of *Pinus jeffreyi*.

Gomphocarpus tomentosus (Torr.) Bot. Mex. Bound. 160 (1859). Gray, Bot. Cal. i. 477 (1876). Type localities, "mountains east of San Diego," and "San Isabel," both in southern California.

Tejon Cañon (No. 1227).

Asclepias eriocarpa Benth. Pl. Hartw. 323 (1849). Type locality, "in collibus siccis juxta prædium Tularcitos in vicinibus Monterey," California.

Seen only on the western slope of the Sierra Nevada at several points between Kernville and Tehachapi (No. 1072).

Asclepias erosa Torr. Bot. Mex. Bound. 162 (1859). Type locality, "valley of the Gila river, near Metate."

In Johnson Cañon, Mill Creek Cañon, and Willow Creek Cañon, Panamint Mountains; on the Darwin Mesa; between Walker Pass and Kernville; along Caliente Creek; between Caliente and Tehachapi; in Antelope Valley, Mohave Desert; on the higher parts of the Tulare Plains, near Tejon Ranch; and in the washes near Poso stage station. The species occurs most abundantly in the clay soil of the western foothills of the Sierra Nevada and apparently only sparingly in the desert.

Asclepias mexicana Cav. Ic. Pl. i. 42 (1791). Type locality, "prope Mexico."

This common Californian milkweed was recorded in but two localities east of the Sierra Nevada: in Johnson Cañon, Panamint Mountains; and near Indian Wells on the stage road from Mohave to Keeler (No. 1010). At both places it grew in moist soil. On the west side of the Sierra Nevada it was of frequent occurrence.

Asclepias speciosa Torr. Ann. Lyc. N. Y. ii. 218 (1828). Type locality, "on the Canadian [River]."

At Watkins's ranch, Ash Meadows (No. 349), and near Lone Pine (No. 898).

LOGANIACEÆ.

Buddleia utahensis Coville, Proc. Biol. Soc. Wash. vii. 69 (1892). Type locality as given below. PLATE XII.

"Shrub 20 to 30 cm. high, young branches, leaves, and calyces densely tomentose; leaves linear to narrowly linear-oblong, irregularly crenate, with undulate revolute margins, conspicuously venose-reticulate, 1.5 to 2 cm. long, reflexed or divaricate on petioles 1 to 2 mm. long, with smaller leaves axillary-fasciculate; inflorescence made up of 2 to 4 distinct spheroidal congested clusters (about 1.5 cm. in diameter and about the same distance apart) of flowers, spicately arranged at the extremities of the branches; bracts subtending the clusters similar to the leaves, the uppermost much smaller; calyx lobes 1-nerved; corolla in dried specimens brownish purple, weathering to straw color, tube tomentose without, lobes widely spreading; anthers sessile in the throat of the corolla.

"This plant is closely related to *B. marrubiifolia*, but is readily distinguished by its spicate flower clusters and narrow leaves. In that species the single spherical head terminates the branches upon a well-defined peduncle, while the leaves vary from ovate to obovate with cuneate base.

"Type specimen in the United States National Herbarium; collected in 1877 near St. George, southern Utah, by Edward Palmer.

"The plant has been collected but twice, once in the type locality and now at the foot of a limestone cliff just north of Mountain Springs, near Olcott Peak, Charleston Mountains, Nevada (No. 386). The former is the most northerly locality known for any species of the genus. *B. marrubiifolia* is known in the United States only in southern Texas."

GENTIANACEÆ.

Erythræa exaltata (Hook.) Fl. Bor. Amer. ii. 69 (1838), under *Cicendia*. Type locality, "between the Kettle Falls and Narrows, of the Columbia River, N. W. C."

Willow Creek Cañon, Panamint Mountains (No. 818). The name given above is an older one for *E. douglasii.*[1]

Erythræa nuttallii Wats. Bot. King Surv. 276 (1871). Type locality, "Unionville, Huntington, and Ruby Valleys, Nevada; 4,500–6,000 feet altitude."

Resting Springs Valley (No. 275).

Erythræa venusta Gray, Bot. Cal. i. 479 (1876). Type locality not given; range, "through all the southern part of the State, and extending (mostly in a smaller form) along the Sierra Nevada to Sierra Co., up to about 4,000 feet."

On the western slope of the Sierra Nevada (Nos. 1287, 1840).

Gentiana amarella acuta (Mx.) Fl. i. 177 (1803), as *G. acuta;* Hook. f. fide Gray, Syn. Fl. ii. pt. i. 118 (1878). Type locality, "in altis montibus Carolinæ et in Canada, prope Tadoussack."

At various points in the Sierra Nevada (Nos. 1593, 1631, 1704, 2074).

Gentiana calycosa Griseb. in Hook. Fl. Bor. Amer. ii. 58 (1838). Type locality, "Mount Rainier," Washington.

On the eastern slope of Farewell Gap (No. 1744).

Gentiana newberryi Gray, Proc. Amer. Acad. xi. 84 (1876). Type locality, as taken from Newberry's specimen,[2] "Crater Pass, Cascade mountains; altitude, 6,000 feet."

Big Cottonwood Meadows, Sierra Nevada (No. 1687).

Gentiana serrata holopetala Gray, Bot. Cal. i. 481 (1876). Type locality not given; range, "wet ground, in the higher regions of the Sierra Nevada: Soda Springs of the Tuolumne, at 8,600 feet, to Mariposa Co. above the Yosemite."

In the high Sierra Nevada (Nos. 1580, 1630, 1675, 1732). The specimens of No. 1675 are very small and 1-flowered, so that they closely resemble *G. simplex*. The seeds, however, which have been well described heretofore, clearly distinguish the two species.

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[1] Gray, Bot. Cal. i. 480 (1876).

[2] Pac. R. Rep. vi. pt. iii. 86 (1857).

Swertia perennis L. Sp. Pl. i. 226 (1753). Type locality European.
Whitney Meadows, Sierra Nevada (No. 1629).

Frasera tubulosa Coville, Proc. Biol. Soc. Wash. vii. 71 (1892). Type locality as given below. PLATE XIII.

"Plant a biennial or short-lived perennial, in our specimens about 60 cm. high; stem stout, terete, glabrous, glaucous, about 6 mm. thick at the base; radical leaves in a dense rosette, linear-oblanceolate, obtuse, mucronate, reaching 1 cm. in width and 9 cm. in length, usually conduplicate and the apex recurved, thick, minutely scabro-puberulent, glaucous in appearance, its margin white, cartilaginous, entire; stem leaves similar, becoming smaller above, in whorls of 5 or 6; inflorescence a narrow, spicate panicle 30 to 40 cm. long, interrupted below, its branches reaching 5 cm. in length, mostly shorter, erect: pedicels 2 to 20 mm. long, erect; sepals 4, linear-subulate, 6 to 8 mm. long, often spinulose-denticulate toward the base; petals 4, white, oblong-obovate, acuminate, 9 to 11 mm. long, slightly gibbous at the base; gland on the face of the petal none, but represented by a tube of the same texture and half as long as the corolla, inserted over the gibbosity at the base of the petal, split about half way to the base in a direction tangential to the axis of the flower, the posterior lobe slightly larger and both lacerate-fimbriate; stamens 4, filaments about as long as the sepals, anthers oval, 2 mm. long; ovary compressed, oblong-lanceolate, tapering into 2 subulate, appressed styles, the whole equaling the stamens; placentæ at the edges of the ovary, not intruded; ovules 6 to 10, oblong, very thin and flat; stigmas recurved-spreading, flat, hardly broader than the style; capsule very flat; valves obovate-oblong, with callous, thickened margins and 1 median nerve continued into the stiff, subulate, persistent style, the whole 12 to 14 mm. long; seed single, lamelliform, oblong, minutely cellular-muriculate, about 5 to 7 mm. long.

"This plant differs from all other species of the genus in the apparent absence of the petaline gland and in the presence of the tubular nectary described above. The leaves are very similar to those of *F. albomarginata*, while the form of the inflorescence resembles that of *F. nitida* and *F. albicaulis*.

"Type specimen in the United States National Herbarium, No. 1598, Death Valley Expedition; collected August 17, 1891, in dry soil under *Pinus jeffreyi* in the northeast corner of the enclosure at Soda Springs, on the North Fork of Kern River, Sierra Nevada, Tulare County, California."

POLEMONIACEÆ.

Phlox austromontana sp. nov.

Plant perennial, suffrutescent, cespitose, 5 to 10 cm. high, the stem, leaves, and calyx minutely canescent-pubescent with glandless hairs; leaves acerose, commonly 1 to 1.5 cm. long, divergent at maturity; calyx 6 to 9 mm. long, the tube oblong-turbinate, slightly longer than the acerose lobes, the intercostal spaces occupied by a replicate membrane: corolla white, or sometimes purplish, the tube 11 to 14 mm. long, the lobes obovate, 5 to 7 mm. long; ovules 1 in each cell; capsule oblong, mucronate, about 5 mm. long, maturing only a single seed, this half surrounded by the enlarged placental axis.

Type specimen in the United States National Herbarium, No. 1944, Death Valley Expedition; collected May 10, 1891, in the nut-pine belt of the Beaverdam Mountains, Utah, by Vernon Bailey.

This species resembles in form *P. douglasii*, but the pubescence and the marked membranaceous replication of the calyx distinguish it. Specimens have been collected near the summit of Cuyamaca Mountain by the Parish Brothers (No. 424, of 1880); in Bear Valley, San Bernardino Mountains, at 7,000 feet altitude, by S. B. Parish (No. 1839, of 1886); and by H. C. and C. R. Orcutt at Hanson's ranch, a short distance south of the national boundary, in Lower California, in 1884. The last specimen has more decidedly purplish flowers and glabrescent herbage.

Phlox cæspitosa Nutt. Journ. Acad. Phila. vii. 41 (1834). Type locality, "Flat-Head river, on the sides of dry hills."

No. 1801, from the White Mountains, is the same as No. 890 of the King Survey, slightly glandular-hairy on the leaves, and decidedly so on the calyx tube. No. 1968, from the vicinity of Panaca, Nevada, is not all glandular. The plants are not the *P. cæspitosa condensata* of Gray, nor the plant that is called in the botany of the King Survey *P. rigida*. They are taken, therefore, to belong to the type form of the species. No. 890 of the King Survey was so referred. The type specimens of our species of *Phlox* are widely scattered and I have not had access to them.

No. 2072, from above timber-line in the Sierra Nevada, near Mount Whitney, is referred doubtfully to this species. The leaves of this plant are glandular-pubescent throughout, while the rootstocks are very slender, almost filiform, and flexuous.

Phlox douglasii Hook. Fl. Bor. Amer. ii. 73 (1838). Type locality, "N. W. America: common on the limestone range of the Blue Mountains [Oregon], and on the Rocky Mountains, near the confines of snow."

At high altitudes in the Sierra Nevada (Nos. 1416, 1548, 1830, 2090).

Phlox gracilis (Dougl.) Bot. Mag. lvi. t. 2924 (1829), under *Gilia;* Greene, Pittonia, i. 141 (1887). Type localities, "on the banks of the Spoken river, and on high grounds near Flathead river, in North-West America."

Near Willow Creek, Panamint Mountains (No. 763). Professor Greene's reference of this plant, so long considered an anomalous *Collomia*, to *Phlox*, as a close relative of *P. drummondii*, appears entirely correct.

Phlox longifolia stansburyi (Torr.) Bot. Mex. Bound. 145 (1859), as *P. speciosa stansburyi;* Gray, Proc. Amer. Acad. viii. 255 (1870). Type locality, "gravelly hills near the Organ Mountains, New Mexico," and "San Luis Mountains."

In the Panamint Mountains (Nos. 744, 2027, 2041), California, and about 30 kilometers east of Panaca, Nevada (No. 1969).

Collomia grandiflora Lindl. Bot. Reg. xiv. under t. 1166 (1828)—Dougl. MS. Type locality[1], "in the northwest of North America, in all the country bordering on the river Columbia, as far to the eastward as the valleys of the Rocky Mountains, but not beyond that great dividing ridge."

Near Mineral King (No. 1452) and Mammoth (No. 1826), both in the Sierra Nevada.

Collomia linearis Nutt. Gen. i. 126 (1818). Type locality, "near the banks of the Missouri, about the confluence of Shian River, and in the vicinity of the Arikaree village, in moist places."

Near Benton (No. 1814).

Linanthus androsaceus (Benth.) Bot. Reg. xx. t. 1710 (1834), under *Leptosiphon;* Greene, Pittonia, ii. 258 (1892). Type locality Californian.

In the valley of the Kaweah River (Nos. 1315, 1461).

Linanthus aureus (Nutt.) Pl. Gamb. 155 (1848), under *Gilia;* Greene, Pittonia, ii. 257 (1892). Type locality, "Santa Barbara."

At the eastern base of the Coso Mountains (No. 908), and in Owens River Valley (No. 1776).

Linanthus breviculus (Gray) Proc. Amer. Acad. xii. 79 (1876), under *Gilia;* Greene, Pittonia, ii. 259 (1892). Type locality, "on the Mohave River, S. E. California."

Near Crystal Spring, Coso Mountains (No. 934).

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[1] Loc. cit. t. 1174.

Linanthus demissus (Gray) Proc. Amer. Acad. viii. 263 (1870), under *Gilia;* Greene, Pittonia, ii. 257 (1892). Type locality, "S. E. California and adjacent part of Arizona; mouth of Diamond River [Arizona]; near Fort Mohave [Arizona]."

In the Vegas Wash (No. 412).

Linanthus dichotomus Benth. Bot. Reg. xix. under t. 1622 (1833). Type locality, "Calfornia."

In Paradise Valley (No. 587), at Maturango Spring (No. 743), and at Leach Point Spring (No. 1870).

Linanthus jonesii (Gray) Syn. Fl. ii. pt. i. 407 (1886), under *Gilia;* Greene, Pittonia, ii. 254 (1892). Type locality, "S. E. California, on the Colorado, at The Needles."

In the Vegas Wash (No. 409), and in Furnace Creek Cañon (No. 465).

Linanthus parviflorus (Benth.) Bot. Reg. xix. under t. 1622 (1833), under *Leptosiphon;* Greene, Pittonia, ii. 258 (1892). Type locality, "California."

Between Kernville and Havilah (No. 1051). This plant is intermediate between *L. parviflorus* and *L. breviculus*, with smaller limb than the latter and shorter tube than the former. It is the *Gilia micrantha* of Steudel.

Linanthus pharnaceoides (Benth.) Bot. Reg. xix. under t. 1622 (1833), under *Gilia;* Greene, Pittonia, ii. 254 (1892). Type locality, "California."

Near Caliente (No. 1108).

Navarretia breweri (Gray) Proc. Amer. Acad. viii. 269 (1873), under *Gilia;* Greene, Pittonia, i. 137 (1887). Type locality, "Sierra Nevada, at Ebbett's and Amador Pass, alt. 8,000 feet."

Black Cañon, White Mountains (No. 1802).

Navarretia matthewsii (Gray) Bot. Cal. ii. 466 (1880), under *Lœselia.* Type locality, "Camp Independence, Inyo County, California."

This species was first seen in flower on the road from Hot Springs to Searles's, and was frequently found after that time in the western part of the desert region; in Mill Creek (No. 760) and Willow Creek cañons, Panamint Mountains; at several points in Owens Valley, such as Lone Pine (No. 885); the road from Keeler to Darwin; the west side of Owens Lake, and the vicinity of Indian Wells. It was found again in Tehachapi Pass and west of Mohave on the open desert. The plant appears to be characteristic of the upper part of the Lower Sonoran zone.

See notes on *Navarretia setosissima punctata.*

Navarretia setiloba sp. nov.[1]

Plant 10 cm. or less high; branches several, or in the smaller specimens none, viscid-puberulent, usually with some larger glandular hairs also; leaves 2 to 3 cm. long, pinnatisect, terminal lobe elliptical-lanceolate, about 1 cm. long, spine-tipped, and sharply spinulose-serrate, midrib and veins prominent beneath, lateral lobes distinct to the rachis and reduced to stiff, green, simple or forked or sparingly branched bristles 4 to 6 mm. long, those of the lowest leaves obsolescent, these leaves therefore petiolate; flowers about 20 or 30 in each head; bracts similar to the leaves, the larger nearly twice as long as the calices, with a scarious dilated base; calyx, in mature fruit, 7 to 9 mm. long, viscid-puberulent, woolly at the mouth, the green and spinescent teeth about one-half as long as the scarious tube; corolla, known only from dried remains, with a slender tube nearly twice as long as the calyx, the expanded limb probably 6 mm. in diameter; capsule 3 mm. long, apparently maturing but a single seed, the embryo of a deep green color.

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[1] For a generic diagnosis of *Navarretia* see Pittonia, i. 130 (1887).

Type specimen in the United States National Herbarium, No. 1049, Death Valley Expedition; collected June 25, 1891, on the west slope of the divide between Kernville and Havilah, Kern County, California, by Frederick V. Coville.

The species most nearly resembles in its vegetative characters *N. viscidula*, *N. atractyloides*, and *N. heterodoxa*, but it is readily distinguished from all these by its leaves, the terminal lobe alone in *N. setiloba* having from 10 to 20 teeth on each side. The leaves of the others are not differentiated into a terminal lobe and have rarely more than 4 teeth on each side throughout their entire length.

Navarretia schottii Torr. Bot. Mex. Bound. 145 (1859). Type locality, "in the Colorado Desert, Sonora," Mexico.

In Panamint Valley (No. 687), and near the Vegas Wash (No. 1900). See notes on *Navarretia setosissima punctata*.

Navarretia setosissima Torr. & Gr. Bot. Ives Exped. 22 (1861). Type locality, "Rocky hill sides, Camp 67." This camp was situated on the banks of the Colorado River at the mouth of Diamond River, in northwestern Arizona, directly north of Peach Springs, a station on the Atlantic and Pacific Railway.

Vegas Valley, Nevada (No. 1887). One plant among these specimens is an intergrade between the type form and the variety described below. See notes on *Navarretia setosissima punctata*.

Navarretia setosissima punctata Coville, Proc. Biol. Soc. Wash. vi. 72 (1892), under *Gilia*—Gray in herb. Type locality as given below. PLATE XIV.

"Flowers and fruit larger than in the type form; corolla with tube about 10 mm. long, its lobes 7 to 10 mm. long, white, with purple dots sometimes arranged in longitudinal lines, and a pair of golden spots at about the middle; capsule 6 to 9 mm. long, often with 10 seeds in each of the 3 cells.

"The plant differs from the type form in the characters above mentioned. In *G. setosissima* the corolla tube has about the same length, but the lobes are much smaller (3 to 5 mm. long) and cream-colored, with neither purple nor yellow markings, and the capsule is commonly about 5 mm. long with about 5 seeds in a cell. This variety holds the same relation to the type form that *G. matthewsii* does to *G. schottii*, except that in the case of the latter two species the differentiation appears to be complete, while in the former integrades in size and coloration occur. The flowers of *G. setosissima* and its variety are regular, erect, and with straight stamens, while those of the other two species are irregular, inserted at an angle or even horizontally, and have ascending stamens. In herbarium specimens this irregularity is often obscured, and *G. schottii* is frequently confounded with *G. setosissima*. Both *G. schottii* and *G. matthewsii* are, however, readily distinguishable from *G. setosissima* and its variety by a vegetative character, which was originally pointed out by Watson, but which was afterward lost sight of. In the former the lateral bristles of the leaf arise singly, in the latter in twos (rarely singly or in threes), from each hair tubercle. This character is constant.

"These four plants are very interesting from the standpoint of their genealogical interrelation. The parent form probably was, or was very similar to, *G. setosissima;* from this *G. schottii* developed; and then, from both these, plants with larger, strikingly colored corollas differentiated, *G. setosissima punctata* and *G. matthewsii*, respectively. The name adopted for the variety is one used on herbarium specimens by Dr. Gray, but never published.

"Type specimen in the United States National Herbarium, No. 716, Death Valley Expedition; collected April 21, 1891, in Surprise Cañon, Panamint Mountains, California, by Frederick V. Coville."

Collected also in Panamint Valley (No. 668), and near Keeler (No. 864).

Gilia.

There appear to be in the collection specimens of *Gilia latiflora exilis*, *G. tenuiflora*, *G. inconspicua*, and *G. inconspicua sinuata*, but I am unable, even after an examination of the material in the Gray Herbarium, to make satisfactory identifications of them. Several types, including the four named above, occur among them, but it seems impossible to define the species clearly from dried specimens.

Nos. 404, 449, 450, 562, 590, 620, 639, 694, 772, 780, and 910 belong to this group. No. 772 is glabrous and glaucous, and seems never to have been described.

Gilia aggregata (Pursh) Fl. i. 147 (1814), under *Cantua;* Spreng. Syst. Veg. i. 626 (1825). Type locality, "on the banks of the Mississippi."

At Mammoth, Mono County, California (No. 1821).

Gilia achilleæfolia Benth. Bot. Reg. xix under t. 1622 (1833). Type locality, "California."

Near Mineral King, Sierra Nevada (No. 1411).

Gilia congesta Hook. Fl. Bor. Amer. ii. 75 (1838). Type locality, "sandy plains of the Columbia."

Waucoba Cañon, Inyo Mountains (No. 1787); and about 30 kilometers east of Panaca, Nevada (No. 1973).

Gilia densifolia Benth. Bot. Reg. xix. under 1622 (1833), under *Hugelia;* Benth. in DC. Prodr. ix. 311 (1845). Type locality, "California."

Tejon Mountains (No. 1173).

Gilia filiformis Parry in Gray, Proc. Amer. Acad. x. 75 (1874). Type locality, "southern Utah, on the detritus of volcanic rocks."

The corolla in our specimens is of a lemon-yellow color, not "cream-color," as heretofore described, and attains a length, in the largest specimens, of 6 mm. The stems and leaves are glaucous and bear scattered, minute, short-stipitate glands. No. 464 has slightly smaller, paler flowers and a glabrous surface, and therefore more nearly accords with the original specimens, but the differences do not at present appear sufficient to constitute our other plants a variety.

The species was recorded in Furnace Creek Cañon (No. 464); and in Surprise (No. 623), Hall (No. 692), Mill Creek, and Willow Creek cañons, Panamint Mountain.

Gilia floccosa Gray, Proc. Amer. Acad. viii. 272 (1870). Type locality not given; range, "California to Arizona, interior of Oregon, and Utah."

No. 2143 differs from typical *G. floccosa* in having its anthers of only one-half or one-third the usual length, and its leaves uniformly pinnate.

This species was collected in Mill Creek Cañon, Panamint Mountains (Nos. 757, 2143); near Lone Pine (No. 886); near the mouth of the Vegas Wash (No. 1896); in the Ralston Desert (No. 1995), and appears to be an abundant species of the Lower Sonoran zone, extending sometimes a little above it.

Gilia gilioides (Benth.) Bot. Reg. xix. under t. 1622 (1833), under *Collomia;* Greene, Erythea, i. 93 (1893). Type locality, "California."

Near Havilah (No. 1088), and in the valley of the Kaweah River (No. 1319). A small and simple-leafed state. Determined by E. L. Greene.

Gilia latifolia Wats. in Parry, Amer. Nat. ix. 347 (1875). Type locality, "southern Utah."

The flowers of this plant, when fresh, are of a clear, deep pink color; but in drying they change to a blue or lilac, or fade entirely.

The species grew in the hottest valleys of the desert, on gravelly mesas, and in washes; in Furnace Creek Cañon (Nos. 222, 456, 570); near Bennett Wells, Death Valley; at the mouth of Surprise, Willow Creek, and Hall (No. 672) cañons, Panamint Mountains; and in Owens Valley, near Swansea (No. 862); and on the road from Keeler to Darwin.

Gilia leptomeria Gray, Proc. Amer. Acad. viii. 278 (1870). Type locality, "mountain valleys of Nevada and Utah."

Near Keeler (No. 851).

Gilia nudicaulis (Hook. & Arn.) Bot. Beech. 368 (1840-41), under *Collomia;* Gray, Proc. Amer. Acad. viii. 266 (1870). Type locality, "Green River, Snake Country," probably in southwestern Wyoming.

Black Cañon, White Mountains (No. 1796). This species appears not to have been found within the limits of California before.

Gilia nuttallii Gray, Proc. Amer. Acad. viii. 267 (1870). Type locality not given; range, "Rocky Mountains of Colorado and Utah to the Sierra Nevada in California."

Between Mineral King and Farewell Gap (No. 1483), in Waucoba Cañon, Inyo Mountains (No. 1790), and in Big Cottonwood Meadows, Sierra Nevada (No. 2130). The Sierran specimens, like others collected in the same region, are larger, less pubescent, and have broader corollas.

Gilia polycladon Torr. Bot. Mex. Bound. 146 (1859). Type locality, "Stony hills, near El Paso, Texas."

Valley of the Virgin River, Nevada (No. 1917).

Gilia pungens squarrosa Gray, Proc. Amer. Acad. viii. 268 (1870). Type locality, "arid districts of Nevada and Utah."

Wood Cañon, Grapevine Mountain (No. 1756).

Gilia virgata floribunda Gray, Proc. Amer. Acad. viii. 272 (1870). Type locality "California."

Valley of the Kaweah River (No. 1318).

Polemonium confertum Gray, Proc. Acad Phil. 1863, 73 (1863). Type locality in the Rocky Mountains, but not specifically given.

Near Mount Whitney (No. 2061).

Polemonium occidentale Greene, Pittonia, ii. 75 (1890). Type localities, "Rocky Mountains of Colorado" and "Californian Sierras."

Specimens of this plant were seen in Trout Meadows, Sierra Nevada.

HYDROPHYLLACEÆ.

Hydrophyllum occidentale (Wats.) Bot. King Surv. 248 (1871), as *H. macrophyllum occidentale;* Gray, Proc. Amer. Acad. x. 314 (1875). Type locality uncertain, but the California plants are apparently intended as the type.

Near Mineral King, Sierra Nevada (No. 1497). These specimens are intergrades between the type and variety *watsoni*.

Nemophila maculata Benth. Journ. Hort. Soc. Lond. iii. 319 (1848). Type locality,[1] "ad rivulos in montibus Sacramento."

Valley of the Kaweah River (No. 1338).

Nemophila spatulata sp. nov.

Annual, branching from the base, more or less appressed-hirsute throughout; branches procumbent, usually less than 10 cm. long; cotyledons oblong to spatulate, entire, petiolate; leaves opposite, spatulate, tapering into a margined petiole, coarsely 3- to 5-toothed, never pinnatifid at the apex, the teeth broad, acute or obtuse, entire; peduncles shorter than the leaves, reflexed, at least in fruit; calyx 1 to 2 mm. long, its lobes ovate-lanceolate, acute, the appendages lanceolate, acute, about one-half as long as the lobes; corolla broadly campanulate, slightly exceeding the calyx or sometimes shorter; internal scales none; filaments about as long as the corolla tubes; anthers ovate; ovary globular-ovate, hispid; stigmas sessile; capsule depressed, and just before dehiscence slightly compressed; seeds 4, globular, 1.5 to 2 mm. in diameter, pale brown, with few or no pits, sparingly scaly and with a conspicuous but deciduous caruncle.

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[1] Benth. Pl. Hartw. 326 (1849.)

Type specimen in the United States National Herbarium, No. 1671, Death Valley Expedition; collected August 21, 1891, in Whitney Meadows, Sierra Nevada, Tulare County, California, by Frederick V. Coville.

The plant most nearly resembles *N. parviflora*, but it is readily distinguished from that species by the shape of the leaves. The form of *N. menziesii* with very small corollas somewhat resembles our plant in general appearance, but its lower leaves, at least, are clearly pinnatifid, its peduncles exceed the leaves, and in the specimens that I have seen the styles are well defined and the scales of the corolla present. The type of leaf in *N. spatulata* is the same as that of *N. maculata*. Our plant was found high up in the Sierra Nevada, while *N. parviflora* is known only from much lower altitudes. In addition to the type number some depauperate specimens, only 1 or 2 cm. high, were collected near the White Chief Mine, above Mineral King (No. 1522).

Macrocalyx bipinnatifidus (Torr.) Bot. Ives Exped. 21 (1860), as *Phacelia micrantha bipinnatifida*. Type locality, "Yampai Valley."

Johnson Cañon, Panamint Mountains (No. 521). This is the *Ellisia torreyi* of Gray.

Macrocalyx membranaceus (Benth.) Trans. Linn. Soc. xvii. 274 (1837), under *Ellisia;* Kuntze, Rev. Gen. Pl. ii. 434 (1891). Type locality Californian, but not specifically given.

Near Mesquite Spring, Funeral Mountains (No. 332).

Macrocalyx micranthus (Torr.) Bot. Mex. Bound. 144 (1859), under *Phacelia*. Type localities, "stony hills near El Paso," Texas, and "Santa Cruz, near Tubac, Sonora."

It appears to have escaped the notice of critical botanical students that Torrey's *Phacelia micrantha* has the broad, transversely lamellar placentæ of *Macrocalyx* (*Ellisia*). The characters of the corolla, placentæ, and seeds, together with the general appearance of the plant, show that it is closely related to *M. chrysanthemifolius*. In the genus *Phacelia* the placentæ are of the ordinary type, and either parietal or sufficiently intruded to divide the ovary into two cells. In *Macrocalyx* the placentæ are parietal, but not of the ordinary type. From near the line of insertion they expand abruptly, into broad, transverse plates which lie against the walls of the ovary and form an interior lining to it. Most of the ovules are inserted on the inner faces of the placentæ, but one is sometimes found on the back. This latter phenomenon occurs normally in *M. chrysanthemifolius* and frequently in *M. micranthus*. The seeds of the latter, on whichever side of the placenta they are found, are transversely corrugated like those on the inner face of the placenta in *M. chrysanthemifolius*. The very broadly V-shaped rudimentary fold opposite each lobe in the corolla-throat of *M. micranthus* (a character quite anomalous in *Phacelia*) is wanting also in the other species of *Macrocalyx*, while the latter do have two scales inserted at a similar angle, opposite each corolla lobe and near the base of the tube.

Specimens were collected in the Vegas Wash (No. 418), in Furnace Creek Cañon (No. 448), in Johnson Cañon (Nos. 560, 622), and in Surprise Cañon (Nos. 657, 712). The plant is a delicate annual and appears to be a common inhabitant of temporarily moist and shaded spots in the cañons of the desert mountains.

Phacelia crenulata Torr. in Wats. Bot. King Surv. 251 (1871). Type locality, "Trinity Mountains, Nevada; 4,500 feet altitude."

In the Funeral Mountains (No. 435), near Bennett Wells, Death Valley (No. 475), and at the mouth of Hall Cañon, Panamint Valley (No. 676).

Phacelia curvipes Torr. in Wats. Bot. King Surv. 252 (1871). Type locality, "foot-hills near Carson and Washoe Cities and on the Trinity Mountains, Nevada; 4,500–6,500 feet altitude."

Near Willow Creek, Panamint Mountains (No. 779), and in the Tejon Mountains (No. 1190). This plant was found only in the Upper Sonoran zone. It is now known at occasional localities from Fort Tejon northward, in the Sierra Nevada, to the vicinity of old Fort Independence and at a few points eastward in the desert mountains of eastern California and western Nevada.

Phacelia fremontii Torr. Bot. Ives Exped. 21 (1860). Type locality, "Yampai Valley," on the line of the present Atlantic and Pacific Railway, near the border between Mohave and Yavapai counties, northwestern Arizona.

Recorded in Johnson (Nos. 511, 516), Willow Creek, and Mill Creek cañons, Panamint Mountains; and between Keeler and Crystal Spring.

Phacelia heterosperma Parish, Bot. Gaz. xiii. 37 (1888). Type locality, "in wet sand, banks of Rock Creek, borders of the Mojave Desert, Los Angeles Co., Calif."

Willow Creek Cañon, Panamint Mountains (No. 814). This species may prove to be one of the forms of *P. lemmoni*, and Dr. Gray has so referred it in his herbarium.

Phacelia hispida Gray, Proc. Amer. Acad. x. 319 (1875), as *P. ramosissima hispida;* Gray, Syn. Fl. ii. pt. i. 161 (1878). Type locality, "Santa Barbara to San Diego, California."

In Johnson Cañon, Panamint Mountains (Nos. 483, 548), and in Shepherd Cañon, Argus Mountains (No. 733).

Phacelia hispida brachyantha var. nov.

Annual, commonly branching from the base, 1 to 3 cm. high, the stem and leaves puberulent and sparingly hispid; leaves pinnatifid to pinnate, divisions oblong and obtusely toothed; racemes rather densely flowered, on peduncles usually a little longer than themselves; pedicels 2 to 4 mm., or the lowest sometimes 7 mm., long, sparingly hispid; calyx densely hispid, the lobes narrowly linear-oblanceolate, acute to obtuse at the apex, filiform at the base, in flower about 5 mm., in fruit reaching 10 mm., long; corolla campanulate-funnelform, pale purple, equaling the calyx lobes; appendages 10 vertical, short, semi-ovate lamellæ inserted just below the middle of the tube, at the base attached to the filament and forming a V-shaped pocket; stamens and style included, the latter cleft more than one-half its length, short-hispid below; ovary ovate, hispid above; ovules 4; capsule about 3 mm. long, globular-ovate, abruptly short-pointed, puberulent and sparingly hispid, dehiscence tardily loculicidal by two valves; seeds 4, oblong, scrobiculate, 2 to 2.5 mm. long, quadrantiform in transection; fruiting calyx campanulate in outline, pendent, deciduous, together with the capsule, by the breaking of the pedicel.

Phacelia hispida has corollas one and one-half times to twice as long as the calyx (therefore 8 to 10 mm. long), and exserted stamens and styles. Both forms are adapted for seed dissemination in a peculiar manner. The recurved fruiting pedicel is smaller at one point, and here it breaks at maturity. The calyx and capsule may now be attached to the fur of passing animals by the divergent, hispid hairs of the former, or, as they are light and airy, they may be blown along the surface of the ground. The tardily dehiscent capsules retain the seeds long enough to scatter them widely.

Type specimen in the United States National Herbarium, No. 607, Death Valley Expedition; collected April 13, 1891, in Surprise Cañon, Panamint Mountains, Inyo County, California, by Frederick Funston. It was found also in Willow Creek Cañon, Panamint Mountains (No. 835), and specimens have been distributed heretofore under the name *P. hispida* from Thumb Butte, near Prescott, Arizona (Rusby, 1883); Mineral Park, Mohave County, Arizona (Mr. and Mrs. Lemmon, June, 1884); Yucca, Arizona (Jones, 1884); and Mount Trumbull, Arizona (Palmer, 1877, Nos. 3341 and 3342).

Phacelia ivesiana Torr. Bot. Ives Exp. 21 (1860). Type localities, "Diamond River," northwestern Arizona; "sandy hills, Oraybe," northeastern Arizona; "banks of the Colorado," at Pyramid Cañon.

In the Vegas Wash, Nevada (No. 421), and near Hot Springs, Panamint Valley (No. 684). Specimens from Oregon, Washington, and Idaho, which have been referred to this species, do not belong to the typical form of it. In geographical range, therefore, the plant is confined to the arid Lower Sonoran region of Arizona, Utah, Nevada, and California.

Phacelia lemmoni Gray, Syn. Fl. ii. pt. i. 417 (1886). Type locality, "N. W. Arizona, on plains, at Mineral Park."

In the Vegas Wash, Nevada (No. 1893), opposite the gypsum cliffs. The corollas of these plants are purple instead of white, as in the type specimens.

Phacelia magellanica (Lam.) Journ. Hist. Nat. i. 373 (1787), under *Hydrophyllum*.

The name *Phacelia circinata* must be replaced by *P. magellanica*. The specific name *circinata* was originally published in 1813[1] as "*Aldæa circinata*" with a note by Schlechtendal: "Planta haec sub nomine Heliotropii pinnati et Hydrophylli magellanici nota est. Celeberrimus Willdenow eam ad novum hocce genus amandovit, cujus illustrationem inchoatam mors praematura interrupit." The question, therefore, whether *Aldea circinata* is identical with *Hydrophyllum magellanicum* does not arise, for the former was founded upon the latter. The date of publication of *Heliotropium pinnatum* is 1794. The case is therefore one of clear priority of the specific name *magellanica*, but the plant of South America may not be identical with that of the United States, and the name *magellanica* applicable, therefore, only to the former.

In No. 1789, from Waucoba Cañon, Inyo Mountains, the leaves are densely canescent with appressed, hispid hairs, while No. 1551, from nearly the altitude of timber-line in the Sierra Nevada, is appressed-hispid, but green.

Phacelia pachyphylla Gray, Proc. Amer. Acad. xix. 88 (1884). Type locality, "dry alkaline lakes near Calico Mines, Mohave Desert," California.

In Furnace Creek Cañon (Nos. 216, 357, 455), Johnson Cañon (No. 567), and Surprise Cañon (No. 703).

Our specimens differ from the ones that have been collected heretofore in their uniformly much larger corolla and correspondingly longer filaments and styles. The corolla is purple, 10 to 15 mm. long, and of about the same breadth. If this character is constant the plant should constitute a new species, but it is possible that under different conditions of moisture the size of the corolla may vary widely.

Phacelia pedicellata Gray, Syn. Fl. ii. pt. i. 160 (1878). Type locality, "Lower California."

In the Funeral Mountains, between Ash Medows and Furnace Creek (No. 436). Our specimens have attained a height of 28 to 40 cm., have stout, branching, brittle stems, sometimes 1 cm. thick at the base, are densely glandular-hairy, when fresh have the rank odor of crushed onions, and, while drying, gave the characteristic brown stain of *Phacelia* more abundantly than did any other species. The published description of the leaves may be somewhat extended. They are oblong in outline, pinnately compound with 3 to 9 oblong pinnæ, the lower, in the fully developed leaves, stalked and lyrately pinnatifid into 2 to 5 lobes. The upper pinnæ are sessile and often confluent, while all are doubly pinnatifid-crenate.

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[1] Willd. Enum. Suppl. 9 (1813).

The species appears to have been collected only in the original locality by Dr. Streets; at Yucca Mohave County, Arizona, in 1884, by Marcus E. Jones; and near Campo, in the Colorado Desert, in 1889, by C. R. Orcutt. By the discovery of the latter locality, together with those in the Death Valley region, the range of the species is established as confined to the Lower Sonoran zone of the desert.

Phacelia perityloides Coville, Proc. Biol. Soc. Wash. vii. 75 (1892). Type locality as given below. PLATE XV.

"Suffrutescent perennial 10 to 20 cm. high, diffusely branched, densely leafy; stem, as well as branches, leaves, and calyx, viscid with glandular hairs, or at the base densely villous-tomentose; leaves alternate; petiole 7 to 15 mm. long; blade orbicular, with truncate to cordate base, crenate-dentate or even lobed, 7 to 12 mm. in diameter, the hairs shorter than on the stem and petiole; flowers in loose racemes terminating the branches; pedicels 3 to 5 mm. long; calyx about 4 mm. long, the lobes oblong-spatulate, obtuse; corolla cream-white, sparingly glandular-hairy, twice as long as the calyx, its narrowly campanulate tube longer than the calyx and its short orbicular lobes abruptly spreading; appendages 10 semilanceolate, vertical lamellæ free from the filaments; the 3 veins of each corolla lobe continuing distinct to the base of the tube; stamens included in the throat of the corolla; anthers oblong; ovary and included style sparingly short-hairy; style tips very short, divergent; capsule narrowly ovate, bluntly acute, 3 to 4 mm. long; seeds apparently very numerous, oblong, angulate by compression, scrobiculate, 5 mm. long.

"The plant closely resembles a small congested specimen of *Perityle emoryi*. The form of the leaves is very similar to that in *P. rotundifolia*, but the plant, while belonging to the subgenus *Eutoca*, differs from all its species in being suffrutescently perennial. The cream-white corollas form another conspicuous character.

"Type specimen in the United States National Herbarium, No. 524, Death Valley Expedition; collected March 31, 1891, in Johnson Cañon, Panamint Mountains, California, by Frederick V. Coville."

Phacelia pulchella Gray, Proc. Amer. Acad. x. 326 (1875). Type locality, "S. Utah."

In the Vegas Wash, Nevada (No. 402). But one specimen was collected and that only in early flower. The calyx is 7 to 9 mm. long and the corolla one-half longer to nearly twice as long, while the appendages of the corolla are semilinear rather than semioblong. The plant resembles this species, however, more nearly than any other.

Phacelia ramosissima Hook. Fl. Bor. Amer. ii. 80 (1838). Type locality, "dry rocky plains of the Columbia, near the Priest's Rapid, 'and at the Stony Islands, N. W. America."

Near Crystal Spring, Coso Mountains (No. 932), and in the vicinity of Fort Tejon (No. 1154).

Phacelia rotundifolia Torr. Bot. King Surv. 253 (1871). Type locality, "Southern Utah."

In Surprise (No. 633) and Hall (No. 691) cañons, Panamint Mountains. This is a Lower Sonoran species of the desert region of California, Nevada, Utah, and Arizona.

Phacelia tanacetifolia Benth. Bot. Reg. xx. t. 1696 (1834). Type locality, "California."

Tejon Mountains (No. 1189).

This plant was probably first described in Trans. Hort. Soc. Lond. ser. 2. i. 479, but the dates of issue of the several parts of that publication are not precisely known.

Lemmonia californica Gray, Proc. Amer. Acad. xii. 162 (1877). Type locality, "San Bernardino County, California, on Bear Valley Creek, on the headwaters of the Mohave River."

Observed only on the western slope of Walker Pass (No. 1022), and at a few points between Kernville and Caliente.

Tricardia watsoni Torr. Bot. King Surv. 258 (1871). Type locality, "on foot-hills of Truckee Pass and the Trinity Mountains, Western Nevada; 4-4, 500 feet latitude."

In Surprise (No. 654) and Willow Creek (No. 837) cañons, Panamint Mountains. This peculiar plant has been found at several widely separated points in Utah, Nevada, and southeastern California, but it appears to be nowhere abundant. Its zonal position is not clear, but in the two places in which it was collected it occurred near the line between the Upper and Lower Sonoran zones.

Emmenanthe penduliflora Benth. Trans. Linn. Soc. xvii. 281 (1837). Type locality Californian, but not specifically given.

This is one of the few plants that grow in the desert as well as the intramontane regions of California. It occurred in Johnson (No. 552) and Surprise (No. 602) cañons, Panamint Mountains, at both points in the upper part of the Lower Sonoran zone, and again along the road from Kernville to Caliente (No. 1056), below the chaparral belt.

Draperia systyla (Gray) Proc. Amer. Acad. vi. 37 (1861), under *Nama;* Torr. Proc. Amer. Acad. vii. 401 (1868). Type locality, "in the interior of California."

In the valley of the Kaweah River (No. 1339). This, the only species of the genus, is confined to the Sierra Nevada of California.

Eriodictyon angustifolium Nutt. Pl. Gamb. 181 (1848). Type locality, "on the Sierra of Upper California."

In the regions in which the expedition met with this plant and *E. californicum* the two did not intergrade, and until more is known of the supposed connecting forms in extreme southern California and Lower California, it seems best to treat them as distinct. *E. angustifolium* was found only in Mountain Springs Pass, Charleston Mountains.

Eriodictyon californicum (Hook. & Arn.) Bot. Beech. 364 (1840-41), under *Wigandia;* Greene, Pittonia, ii. 23 (1889). Type locality Californian. The type specimens were collected by Douglas.

This is the *Eriodictyon glutinosum* of Bentham. It was seen on the south slope of Cajon Pass (No. 107), again on the South Fork of Kern River near Kernville (No. 1034), and at several points between that place and Tehachapi Valley, growing below the chaparral belt. The species is, therefore, characteristic of the Lower Intramontane zone of southern California. It is the common yerba santa.

Eriodictyon tomentosum Benth. Bot. Sulph. 36 (1844). Type locality Californian. The original specimens were collected by Douglas.

It should be noted that if this species proves to be confluent with *E. crassifolium* Benth., from San Diego, California, that name has precedence over *E. tomentosum.*

The plant was collected in the Cañada de las Uvas (No. 1142); and was found also by Dr. Merriam in the valley of Peru Creek, on the south slope of the Liebre Mountains.

Marilaunidium aretioides (Hook. & Arn.) Bot. Beech. 374 (1840-41), under *Eutoca.* Type locality, "between Burnt and Malheur Rivers," eastern Oregon.

Near Willow Creek, Panamint Mountains (No. 765). This species was first placed doubtfully in *Eutoca,* afterward[1] separated interrogatively as a section of that genus under the subgeneric name *Conanthus,* and finally[2] erected into a genus of the same name. The close relationship of the genus, which contains but this species, with our other desert species of *Nama* has long been recognized. Bentham and Hooker say of it,[3] "Genus a *Phacelia* parum distinctum habitu, seminibus lævibus, staminibus inæqualibus, et hoc charactere *Namæ* accedit, a qua imprimis stylis connatis differt." Asa Gray also said,[1] "A single species, which would be referred to *Nama* except for the united styles." Upon examination of *Marilaunidium* (*Nama*) *demissum* it is found that the two styles, while organically distinct, are usually closely coherent throughout the greater part of their length. In the process of drying, however, the styles are usually drawn apart. In *Conanthus aretioides* the styles when dried still remain attached. It was ascertained by Miss Effie A. Southworth, who kindly examined the styles of both plants in transection, that in *Conanthus* the two styles have become organically connected, the epidermis being merely slightly indented along the line of union, while in *Marilaunidium demissum* the epidermis of each style continues entirely across the line of cohesion. Such a difference alone, however, is too insignificant to form the basis of a genus. Since this character of united styles alone keeps *Conanthus* distinct, it being in all other respects a *Marilaunidium*, it seems best to transfer it to that genus, as a species closely related to *M. demissum*.

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[1] A. DC. Prodr. ix. 295 (1845).

[2] Wats. Bot. King Surv. 256 (1871).

[3] Gen. Pl. ii. 829 (1876).

The species is known only from the Upper Sonoran zone in the Great Basin region of Oregon, California, Nevada, and Arizona.

Marilaunidium demissum (Gray) Proc. Amer. Acad. viii. 283 (1873), under *Nama;* Kuntze, Rev. Gen. Pl. ii. 434 (1891). Type locality, "dry or desert regions of Nevada."

In the Vegas Wash, Nevada (No. 413), in Mill Creek Cañon, Panamint Mountains (No. 758), western slope of Walker Pass (No. 1023), at Leach Point Spring (No. 1871), and between Ash Meadows and Furnace Creek Ranch (No. 2153). The styles of this species are often coherent except at the base and the apex. It is confined in the United States to the Lower Sonoran zone of southeastern California, Nevada, Utah, and Arizona, and extends southward into Sonora and Lower California.

Marilaunidium rothrockii (Gray) Bot. Cal. i. 621 (1876), under *Nama;* Kuntze, Rev. Gen. Pl. ii. 434 (1891). Type locality, "meadows, on S. Kern River, at 5,000 feet."

In the Sierra Nevada near Soda Springs (No. 1606), near Whitney Meadows (No. 1719), and on the Hockett Trail between Lone Pine and Big Cottonwood Meadows (No. 2152). Of a group of three species of *Nama*, anomalous in habit and confined in distribution to the San Bernardino and Sierra Nevada ranges, Professor Greene has transferred two, *N. lobbii* and *N. parryi*, to *Eriodictyon;* and although *N. rothrockii* has the technical capsular character of *Nama*, one can not doubt from the general characteristics of the plant that its genealogical source is the *Eriodictyon* generic type.

This plant was always found in or a little above the zone of *Pinus jeffreyi*.

BORAGINACEÆ.

Coldenia canescens DC. Prodr. ix. 559 (1845). Type locality, "in Mexico inter Santander et Victoria," State of Tamaulipas.

At Bunkerville, Nevada (No. 1935).

Coldenia hispidissima (Torr.) Pac. R. Rep. ii. pt. iv. 170 (1855), under *Eddya;*[2] Gray, Proc. Amer. Acad. iv. 340 (1862). Type locality, "on the Rio Grande about El Paso."

Near the Vegas Wash, Nevada (No. 1898). In these specimens the surface of the leaf, between the bristles, is canescently short-villous.

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[1] Syn. Fl. ii. pt. i. 171 (1878).

[2] With the description is published the note "*Ehretia? hispida* of the first edition of this report.". I am unable to find the publication to which allusion is thus made.

Coldenia nuttallii Hook. Kew Journ. Bot. iii. 296 (1851). Type locality, as taken from Nuttall's plant, "Rocky Mountains."

Between Darwin and Keeler (No. 947).

Coldenia plicata (Torr.) Bot. Mex. Bound. 136 (1859), as *Tiquilia brevifolia plicata*. Type locality "desert west of the Colorado, California."

Near Saratoga Springs, Death Valley (No. 248), and near the Vegas Wash, Nevada (No. 1897). This plant has passed currently under the name *Coldenia palmeri*.

Heliotropium curassavicum L. Sp. Pl. i. 130 (1753). Type locality, "in Americæ calidioris maritimis."

This nearly cosmopolitan herb grew almost everywhere about alkaline pools, both in the desert and in the Tulare Plains. Specimens were collected in Furnace Creek Cañon (No. 217) and near St. Thomas, Nevada (No. 1927).

Pectocarya linearis (Ruiz & Pav.) Fl. Peruv. ii. 6 (1799), under *Cynoglossum;* DC. Prodr. x. 120 (1846). Type locality, "in Sancti Jacobi Chilensis campis aridis."

In the Vegas Wash, Nevada (No. 422), and at several points in the Panamint Mountains (Nos. 488, 675, 721). I have seen no Chilian specimens, but I have followed Dr. Gray in adopting that name for our plant.

Pectocarya penicillata (Hook. & Arn.) Bot. Beech. 371 (1840–41), under *Cynoglossum;* A. DC. Prodr. x. 120 (1846). Type locality Californian.

Near Havilah (No. 1089).

Pectocarya setosa Gray, Proc. Amer. Acad. xii. 81 (1876). Type locality, "S. E. California, on the desert plains of the Upper Mohave River."

The plant was seen only in Surprise (No. 642), Mill Creek (No. 800), and Willow Creek cañons, Panamint Mountains, between Keeler and Crystal Spring, and on the divide between Kernville and Havilah (No. 1055).

Lappula diffusa (Lehm.) Pug. ii. 23 (1830), under *Echinospermum;* Greene, Pittonia, ii. 182 (1892). Type locality not given. The original specimens were collected by Douglas, probably in California.

In the Sierra Nevada (Nos. 1396, 1484), and in the White Mountains (No. 1811). No. 1396 only has fruit. In the other specimens the corollas are not so broad as they have been described.

Allocarya californica (Fisch. & Mey.) Ind. Sem. Petrop. ii. 42 (1835), under *Myosotis;* Greene, Pittonia, i. 20 (1887). Type locality, "in Nova California circa coloniam Ross[icam]."

Whitney Meadows, Sierra Nevada (No. 1620). These specimens are from an altitude unusually high for the species, and they vary in habit from the common form of lower elevations in being of small size, depressed, and with short, procumbent branches. Specimens from an altitude of 3,000 meters in the Rocky Mountains of Colorado are also small.

Plagiobothrys tenellus (Hook.) Kew Journ. Bot. iii. 295 (1851), under *Myosotis*—Nutt. MS.; Gray, Proc. Amer. Acad. xx. 283 (1885). Type locality, "sunny slopes of the mountains along the valley of Cœur d'Aleine River," Idaho.

Near Havilah (No. 1085). Hooker's original mention of this plant can barely constitute publication.

..v1.

Plagiobothrys torreyi Gray, Proc. Amer. Acad. x. 58 (1875), under *F*stem erect, Gray, Proc. Amer. Acad. xx. 284 (1885). Type locality, "Sierra Nevad ne stem some-
in or near the Yosemite;" and "Sierra Valley."

This species has not been reported since it was first described.
collected near Whitney Meadows, Sierra Nevada (No. 1716).

Sonnea jonesii (Gray) Syn. Fl. ii. pt. i. 430 (1886), under *Plagiobothrys;* Greene, Pittonia, i. 23 (1887). Type locality, "S. E. California on the Colorado near The Needles."

In Johnson Cañon (No. 518) and in Hall Cañon (No. 695), Panamint Mountains.

Oreocarya fulvocanescens (Wats.) Bot. King Surv. 243 (1871), as *Eritrichium glomeratum fulvocanescens;* Greene, Pittonia, i. 58 (1887). Type locality, "frequent in the mountains through Nevada, from the base to nearly the highest peaks, and also found in the Wahsatch; 5–11,000 feet altitude."

In the Inyo Mountains (No. 2151).

Oreocarya glomerata (Pursh) Fl. ii. 729 (1814), under *Cynoglossum;* Greene, Pittonia, i. 58 (1887). Type locality, "in Upper Louisiana."

Vegas Valley (No. 1888). Our specimen is without mature fruit.

Oreocarya holoptera (Gray) Proc. Amer. Acad. xii. 81 (1876), under *Eritrichium;* Greene, Pittonia, i. 58 (1887). Type localities, "S. Utah," and "Ehrenberg, Arizona."

In Hall (No. 693) and Surprise (No. 705) cañons, Panamint Mountains. This species has not been reported since it was first described. In many respects it externally resembles *Cryptanthe racemosa,* but it is not suffrutescent.

Eremocarya micrantha (Torr.) Bot. Mex. Bound. 141 (1859), under *Eritrichium;* Greene, Pittonia, i. 59, 1887. Type locality, "sand hills, Frontera, Texas, and in other places along the Rio Grande."

This occurred near Swansea, Owens Valley (No. 874); in Willow Creek Cañon, Panamint Mountains; and in the western part of Antelope Valley, Mohave Desert. Like *Plagiobothrys torreyi* the juice of this plant stains the pressing sheets a handsome mauve color.

Piptocalyx circumscissus (Hook. & Arn.) Bot. Beech. 370 (1840–41), under *Lithospermum;* Torr. Bot. Wilkes Exped. xvii. 414 (1874). Type locality, "Snake Fort, Snake Country," probably in Idaho.

Found between Ash Meadows and Furnace Creek (No. 445); in Surprise Cañon, Panamint Mountains, at 1,800 meters (No. 641); near Keeler (No. 850); in Willow Creek Cañon, Panamint Mountains (No. 766); between Keeler and Crystal Spring; near Lone Pine (No. 887); in Owens River Valley (No. 1775); and in Antelope Valley. All these localities are in the upper part of the Lower Sonoran zone.

Piptocalyx dichotomus Greene, Bull. Cal. Acad. i. 206 (1885), under *Krynitzkia;* Greene, Pittonia, i. 60 (1887). Type locality, "eastern base of the Sierra Nevada, between Boca and Verdi."

Big Cottonwood Meadows (No. 2110). This plant has not been reported since it was first collected near the border line between Nevada and California.

Cryptanthe ambigua (Gray) Syn. Fl. ii. pt. i. 194 (1878), as *Eritrichium muriculatum ambiguum;* Greene, Pittonia, i. 113 (1887). Type locality not given; range, "California and Nevada to Washington Terr[itory]."

In the Tejon Mountains (No. 1186).

Cryptanthe angustifolia (Torr.) Pac. R. Rep. v. 363 (1857), under *Eritrichium;* Greene, Pittonia, i. 112 (1887). Type locality, "on the Colorado and Lower Gila, westward to the mountains."

[illegible] Bennett Wells, Death Valley (Nos. 199, 479), in Furnace Creek Cañon (Nos. [illegible]d in the Vegas Wash (No. 424). No. 479 is a form of *C. angustifolia* with [illegible]owered inflorescence than in the typical form. It is the same as No. 606, [illegible]rom Angeles Bay, Lower California. This species is abundant in the [illegible] zone.

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[1] Syn. Fl.

[2] With the

of this report.

Cryptanthe barbigera (Gray) Syn. Fl. ii. pt. i. 194 (1878), under *Eritrichium;* Greene, Pittonia, i. 114 (1887). Type locality not given; range, "S. California, from Santa Barbara Co. to S. Utah and Arizona."

In Mill Creek Cañon, Panamint Mountains (No. 803).

Cryptanthe cycloptera Greene, Bull. Cal. Acad. i. 207 (1885), under *Krynitzkia;* Greene, Pittonia, i. 120 (1887). Type locality, "Arizona, at Tucson."

The characters originally assigned to this plant, "Nutlets all winged; wings * * * continuous across the base [of the nutlet]; ventral face not muricate," distinguish it clearly from the original of *C. pterocarya.* In that plant one of the nutlets is uniformly wingless, while the wing in the others does not extend across the base of the nutlet, the inner face of which is usually muricate. In both plants, particularly *C. cycloptera,* the wings vary freely from entire to deeply crenate. Dr. Gray united the two plants under *C. pterocarya,* but I have not found a satisfactory series of intergrades. The species was seen in Furnace Creek Cañon (No. 444), and in Johnson and Surprise cañons (No. 720), Panamint Mountains.

Cryptanthe flaccida (Lehm.) Pug. ii. 22 (1830), under *Myosotis*—Dougl. MS.; Greene, Pittonia, i. 115 (1887). Type locality not given; plant collected by Douglas.

Between Kernville and Havilah (No. 1054).

Cryptanthe intermedia (Gray) Proc. Amer. Acad. xvii. 225 (1882), under *Eritrichium;* Greene, Pittonia, i. 114 (1887). Type locality, "southern part of California to adjacent Arizona."

In the Vegas Wash (No. 423), in Furnace Creek Cañon (No. 442), in Johnson Cañon (No. 558), in Hall Cañon (No. 700), and between Kernville and Havilah (No. 1058). This is one of the most abundant species of the genus in the Lower Sonoran zone.

Cryptanthe pterocarya (Torr.) Bot. Wilkes Exped. xvii. 415 (1874), under *Eritrichium;* Greene, Pittonia, i. 120 (1887). Type locality, "Walla Walla River, Washington Territory."

Near Crystal Spring, Coso Mountains (No. 920).

Cryptanthe racemosa (Gray) Proc. Amer. Acad. xvii. 226 (1882), under *Eritrichium*—Wats. in herb.; Greene, Pittonia, i. 115 (1887). Type locality, "Mesquite Cañon, San Bernardino County, California."

This is the only suffrutescent *Cryptanthe* known. It occurred in a cañon of the Funeral Mountains, opposite Bennett Wells (No. 206), and in Surprise (No. 704) and Willow Creek cañons, Panamint Mountains. The species always grew in cañons and always within the limits of the Lower Sonoran. One specimen was collected, the woody base of which was 7 mm. in diameter.

Cryptanthe ramosissima Greene, Bull. Cal. Acad. i. 203 (1885), under *Krynitzkia;* Greene, Pittonia, i. 116 (1887). Type locality, "Mohave Desert."

Near Bennett Wells, Death Valley (Nos. 197, 480, 2150), in Furnace Creek Cañon, Funeral Mountains (No. 446), in Surprise Cañon, Panamint Mountains (No. 701). The specific name is probably untenable, since it was first proposed by Dr. Gray[1] as a substitute for the older *Eritrichium* (now *Cryptanthe*) *racemosum,* and at that time included only by an error the plant to which Professor Greene has limited it. The species is abundant on the open gravelly mesas of Death Valley, and probably in many other parts of the Lower Sonoran zone.

Cryptanthe recurvata sp. nov. PLATE XVI.

Plant annual, 10 to 15 cm. high, sometimes depauperate and smaller; stem erect, usually branching, appressed-hirsute, the hairs on the lower part of the stem sometimes divergent; leaves linear-oblanceolate, the larger ones about 1.5 cm. long, divergently hirsute; inflorescence racemiform; false racemes terminating the main axis and the branches, in fruit 2 to 4 cm. long, secundiflorous; flowers 2 mm. long; corolla minute, barely exserted from the calyx; fruiting calyx 3 to 4 mm. long, recurved; sepals linear-filiform, slightly dilated and keeled near the base, hirsute with a few small hairs like those of the stem, and hispid toward the base with stiff divergent hairs half as long as the calyx; nutlet single, 1.5 to 1.8 mm. long, muriculate on both faces, ovate-lanceolate or ovate with an acumination, apex slightly incurved, angles rounded, a faint median line visible on the back, the inner face with a closed groove dilated into a small triangular areola at the base.

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[1] Proc. Amer. Acad. xx. 277 (1885).

Type specimen in the United States National Herbarium, No. 713, Death Valley Expedition; collected April 21, 1891, at an altitude of 800 meters, in Surprise Cañon, Panamint Mountains, Inyo County, California, by Frederick V. Coville.

The sheet of No. 850, King Survey, in the National Herbarium, distributed as *Eritrichium angustifolium*, contains a specimen of this plant. It was collected in the Trinity Mountains, Nevada, at an altitude of 5,000 feet. In the Gray Herbarium is a sheet of the same plant, collected at Candelaria, Nevada, in 1886, No. 260, by W. H. Shockley. Dr. Gray referred it doubtfully to *C. angustifolia*. The species may be distinguished at sight from all the related ones by its recurved fruiting calyx.

Cryptanthe submollis (Gray) Proc. Amer. Acad. xiii. 374 (1878), as *Eritrichium holopterum submolle*. Type locality, "St. George, S. Utah."

Surprise Cañon, Panamint Mountains (No. 714). This is the *Krynitzkia utahensis* of Gray. The species is now for the first time reported from California. It has been collected also at Yucca, Arizona, by Jones, and at Candelaria, Nevada, by Shockley, No. 347, of 1886.

Amsinckia spectabilis Fisch. & Mey. Ind. Sem. Petrop. ii. 26 (1835). Type locality not given.

Near San Bernardino (No. 35).

Amsinckia tessellata Gray, Proc. Amer. Acad. x. 54 (1874). Type localities, "Contra-Costa Mountains near Monte Diablo" "Fort Tejon," "near Carson City," "Sierra County," "Humboldt Mountains," "and Pahranagat Mountains."

This desert annual is confined to the Lower Sonoran zone of the desert. It was seen first in the Vegas Wash, near its mouth (No. 408), and afterward was found to be a common spring flower. It occurred in Johnson Cañon and the wash leading from it (Nos. 484, 517); in Surprise Cañon; near the Summit Station, on the road from Mohave to Searles's; in Mill Cañon, and Willow Creek Cañon, Panamint Mountains; and near Crystal Spring, Coso Mountains. No. 484 only is in fruit.

Pulmonaria sibirica L. Sp. Pl. i. 135 (1753). Type locality, "in Siberia."

Near Mineral King, Sierra Nevada (No. 1398). This is the *Mertensia sibirica* of most post-Linnæan authors. Our plant has larger flowers and more nearly glabrous calyx lobes than is usual in the American plant.

CONVOLVULACEÆ.

Convolvulus longipes Wats. Amer. Nat. vii. 302 (1873). Type locality, "southern Nevada."

Between Kernville and Havilah (No. 1065).

Convolvulus villosus (Kellogg) Proc. Cal. Acad. v. 17 (1873), under *Calystegia*; Gray, Proc. Amer. Acad. xi. 90 (1876). Type locality, "on hillsides at Cisco, C. P. R. R., 6,000 feet high on Sierra Nevada mountains."

Near Mineral King, Sierra Nevada (No. 1441). The blades of the leaves reach 4.5 cm. in breadth.

Cressa cretica truxillensis (H. B. K.) Nov. Gen. & Sp. iii. 119 (1818), as *C. truxillensis;* Choisy in DC. Prodr. ix. 440 (1845). Type locality, "in arenosis salsis Oceani Pacifici, prope Truxillo Peruvianorum."

Valley of the Virgin River, Nevada (No. 1913).

Cuscuta californica Choisy, Cusc. Enum. 279 (1841). Type locality, "Nov[am] Californiam."

This parasite was seen in the San Bernardino Valley (No. 102); in the cañon of Mesquite Spring, Funeral Mountains (No. 338); between Lone Pine and Olancha; along the South Fork of Kern River; and between Havilah and Kernville. The species is parasitic on a variety of shrubs, No. 102 growing on *Adenostoma fasciculatum*, No. 338 on *Peucephyllum schottii.*

SOLANACEÆ.

Solanum douglasii Dunal in DC. Prodr. xiii. pt. i. 48 (1852). Type locality, "in nova California."

Hall Cañon, Panamint Mountains (No. 696).

Solanum nigrum L. Sp. Pl. i. 186 (1753). Type locality not given.

Near Visalia (No. 1256).

Solanum xanti Gray, Proc. Amer. Acad. xi. 90 (1876). Type locality not given; range, "California, through the southern and eastern parts of the State, but extending to Sierra County and to Nevada, near Carson."

This handsome plant occurred near the head of Willow Creek, Panamint Mountains (No. 784); between Kernville and Havilah (No. 1064); and at other points between the latter place and Tehachapi Cañon.

Physalis crassifolia Benth. Bot. Sulph. 40 (1844). Type locality, "Bay of Magdalena," Lower California.

Furnace Creek Cañon, Funeral Mountains (No. 214), and Boundary Cañon, Grapevine Mountains (No. 976). The fruiting calyx in our specimen is only 1.5 cm. long.

Lycium andersonii Gray, Proc. Amer. Acad. vii. 388 (1868). Type locality, "S. E. part of State of Nevada."

This shrub, which is a common and characteristic one of the Lower Sonoran zone in the Mohave Desert region, although not positively distinguished in the early winter, was later recorded near Swansea, at the western base of the Inyo Mountains; on the Darwin Mesa (No. 879); in Saline Valley, at the mouth of Willow Creek Cañon; between Keeler and Crystal Spring; at many points between Lone Pine and Walker Pass; on the west slope of Walker Pass; in Tehachapi Cañon; and in Antelope Valley. Dr. Merriam found the plant abundantly farther north and east, as follows: in Deep Spring Valley, California; Fish Lake, Oasis, Indian Spring, Emigrant, Timpahute, and Pahranagat valleys, Grapevine Cañon, and Pahroc Plain, Nevada; and the Beaverdam Mountains, Utah (No. 1950).

Lycium cooperi Gray, Proc. Amer. Acad. vii. 388 (1868). Type locality, "east slope of Providence Mountain, in the Mohave District, California."

This species is a stout shrub 1 to 2 meters high, with the bark of the trunk and larger branches smooth and dark brown.

Along the western part of the Mohave Desert region, from Owens Lake southward, this plant was found in nearly the same localities as *L. andersonii*, but ranging at a uniformly higher altitude in the Lower Sonoran zone. It undoubtedly occurs at many other points eastward in the desert. Specimens were collected in Willow Creek Cañon, Panamint Mountains (No. 826); on the Darwin Mesa (No. 907); near Crystal Spring, Coso Mountains (No. 929); and in Gold Mountain, Nevada (No. 2005). Dr. Merriam found the shrub also in Oasis Valley, Amargosa Desert, and Mount Magruder, Nevada.

Lycium pallidum Miers, Ann. & Mag. Nat. Hist. ser. 2. xiv. 131 (1854). Type locality, "in Nova Mexico."

This species was observed by Dr. Merriam and Mr. Bailey in the Beaverdam Mountains, Utah (No. 1951), and in the valley of the upper Santa Clara.

Lycium torreyi Gray, Proc. Amer. Acad. vi. 47 (1861). Type localities, "Texas, on the Rio Grande, to Fort Yuma, interior of California."

In the valley of the Muddy River near St. Thomas, Lincoln county, Nevada (No. 1928), and at St. George, Utah (No. 1952).

Datura meteloides DC. Prodr. xiii. pt. i. 544 (1852). Type locality, "in calidis Novæ Hispaniæ regionibus."

This western representative of the eastern jimson weed occurred occasionally in the desert, usually in cultivated and therefore moist ground. It was seen at Corn Creek, Vegas Valley; in Johnson, Surprise, and Hall cañons, Panamint Mountains; near Lone Pine; and near Indian Wells. In the intramontane region it was of common occurrence in similar situations.

Nicotiana attenuata Wats. Bot. King Surv. 276 (1871)—Torr. MS. Type localities, "near Carson City," "Lake Washoe," "Fort Tejon," points in Nevada and California.

Near Crystal Spring, Coso Mountains (No. 913). This species is characteristic of, if not entirely confined to, the Great Basin and desert regions. In intramontane California it appears to be replaced by *N. bigelovii*, but a sufficient amount of material to decide this question was not collected.

Nicotiana trigonophylla Dunal in DC. Prodr. xiii. pt i. 562 (1852). Type locality, "in Mexico ad Aguas calientes," State of Aguas Calientes.

This plant is a common one in cañons of the desert mountains. Specimens were collected in the Funeral Mountains, near Saratoga Springs (No. 255), and in Johnson Cañon, Panamint Mountains (Nos. 515, 549). In No. 255, a winter specimen with mature fruit, the capsules are one-half exceeded by the calyx, a character attributed to *N. palmeri*. In the whole region examined by the survey this plant occurred only in cañons or steep rocky slopes, and was invariably a slightly suffrutescent perennial. Other specimens from western Mexico and Lower California exhibit the same tendency, although the species is described as annual.

CSROPHULARIACEÆ.

Mohavea breviflora sp. nov. PLATE XVII.

Annual; stem simple, or branched from the base, 12 cm. or less high; leaves 1 to 4 cm. long, oblong-lanceolate, acuminate at the apex, tapering at the base into a margined petiole; calyx lobes linear-oblong, obtuse or bluntly acute, about 10 mm. in length; corolla 18 to 20 mm. long, its lobes entire or slightly undulate; lower lip 5 to 7 mm. long above the yellow palate, cleft nearly to it; palate pubescent over nearly its entire surface; seeds 2 to 2.5 mm. long; otherwise resembling *Mohavea viscida*.

Type specimen in the United States National Herbarium, No. 547, Death Valley Expedition, collected April 4, 1891, in Johnson Cañon, Panamint Mountains, California, by Frederick V. Coville and Frederick Funston.

This plant may be distinguished readily from *M. viscida* by its smaller size, shorter and broader leaves, and proportionally much shorter corolla limb. *M. viscida* grows 20 to 30 cm. high and has a corolla 30 to 35 mm. long, erose-denticulate lobes, and lower lip 18 mm. long above the palate, the sinuses reaching only to within 10 or 12 mm. of that organ. The corolla of *M. viscida* is conspicuously purple-dotted and has a purple-tipped palate, while the lemon-yellow corolla in our species has very few and inconspicuous, if any, purple dots. In both species of the genus there is found to be a rudiment of the fifth stamen, similar to the rudiments of the other two abortive ones.

The plant was first observed in Long Valley on the same day on which we entered Death Valley, and afterward in the southern part of the Funeral Mountains, near Saratoga Springs; on the mountain slope east of Resting Springs; in Furnace Creek Cañon; in the Vegas Wash; in Johnson (No. 547), Hall, and Surprise cañons, Panamint Mountains; and in a cañon of the Inyo Mountains, near Swansea.

Antirrhinum filipes Gray, Bot. Ives Exped. 19 (1860). Type locality, "desert arroyos," along the Colorado River.

Between Ash Meadows and Furnace Creek Ranch (No. 459), and in Johnson Cañon, Funeral Mountains (No. 525). About the base of the plant in our specimens are borne cleistogamous fertile flowers, the corollas of which scarcely exceed their calices. The flowers borne above have corollas of the normal size, about 15 mm. long. From specimens bearing only cleistogamous flowers the plant was evidently first described, while other specimens collected later near Fort Mohave, Arizona, bearing large corollas, were described[1] as *A. cooperi.*

Scrophularia californica Cham. Linnæa, ii. 585 (1827). Type locality, "ad portum St. Francisci."

Observed in Surprise, Willow Creek (No. 959), and Mill Creek cañons, Panamint Mountains; near Crystal Spring, Coso Mountains (No. 912); and in the valley of Kern River, between Walker Pass and Caliente. In the ultramontane station the plant grew near the line between the Upper Sonoran and Lower Sonoran zones.

Pentstemon acuminatus Lindl. Bot. Reg. xv. 1285 (1829)—Dougl. in herb. Type locality, "barren sandy plains of the Columbia."

Black Cañon, White Mountains (No. 1793). Our specimens are but 20 to 30 cm. high, and the bracts of the inflorescence are not so conspicuously developed as they usually are in the species.

Pentstemon antirrhinoides Benth. in DC. Prodr. x. 594 (1846). Type locality, "in California."

On the south slope of the San Bernardino Mountains (No. 105).

Pentstemon azureus parvulus Gray, Syn. Fl. ii. pt. i. 272 (1878). Type locality, "northern part of California, in mountains above Jackson Lake, at 8,000 feet."

Near Mineral King, Sierra Nevada (No. 1463).

Pentstemon breviflorus Lindl. Bot. Reg. xxiii. t. 1946 (1837). Type locality Californian.

Between Walker Basin and Caliente (No. 1095).

Pentstemon bridgesii Gray, Proc. Amer. Acad. vii. 379 (1868). Type locality of Bridges's specimen not specifically given; of Bolander's specimen, "Yosemite Valley," California.

Near Mineral King (No. 1443).

Pentstemon centranthifolius Benth. Trans. Hort. Soc. Lond. ser. 2. i. 481 (1835), under *Chelone;* Benth. Scroph. Ind. 7 (1835). Type locality Californian.

On the south slope of the San Bernardino Mountains (No. 121) and in the Cañada de las Uvas (No. 1143).

Pentstemon confertus procerus (Graham) Edinb. New Phil. Journ. vii. 348 (1829), as *P. procerus*—Dougl. MS. Type locality not specifically given.

In the high Sierra Nevada (Nos. 1449, 2049, 2138), and the White Mountains (No. 1810). This plant has passed for many years under the name *Pentstemon confertus cæruleo-purpureus.*

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[1] Proc. Amer. Acad. vii. 376 (1868).

Pentstemon davidsonii Greene, Pittonia, ii. 241 (1892). Type locality, "on Mt. Conness, at an altitude of 12,300 feet."

This plant is clearly distinguishable from *P. newberryi* by its purple corollas, included anthers, and smaller, entire leaves, that plant having a red corolla, anthers visible in dried specimens, and larger, serrate leaves. It was found at timber line above the belt of *P. newberryi*, and has been collected at Mono Pass, on Mount Shasta, and in the Cascades. Our specimens came from Farewell Gap (No. 1574), and from the mountains north of Whitney Meadows (No. 1665).

Pentstemon fruticiformis sp. nov.

Perennial, suffrutescent, 30 to 50 cm. high, much branched from the base, glabrous throughout; leaves narrowly linear-lanceolate, 3 to 5 cm. long, 2.5 to 5 mm. broad, entire; inflorescence paniculate; pedicels and internodes of the branches of the panicle commonly 1 or 2 cm. long; sepals ovate, abruptly acute or short-acuminate, 4 to 5 mm. long, the narrow hyaline margins entire or obsoletely denticulate; corolla pink or pale rose-color, about 2.5 cm. long, cleft about one-third its length, the throat broad, the lower lip bearded, otherwise glabrous; fertile stamens glabrous, the anthers dehiscent through the commissure, and explanate; sterile filament densely bearded at the apex; capsule narrowly ovate, with a spinescent acumination, the whole 1 to 1.5 cm. long, the four valves little diverging at maturity; mature seeds not seen.

Type specimen in the United States National Herbarium, No. 2044, Death Valley Expedition, collected June 24, 1891, in Wild Rose Cañon, Panamint Mountains, Inyo County, California, by Vernon Bailey.

The specific name is descriptive of the habit of the plant, which in its much branched, rounded form resembles a typical desert shrub. The species has been collected in fruit in the Mohave Desert, by G. R. Vasey (No. 463 of 1880). In the Panamint Mountains the plant is an abundant and characteristic species of the nut pine belt.

Pentstemon glaber Pursh, Fl. ii. 738 (1814). Type locality, "in Upper Louisiana."

Near Crystal Spring, Coso Mountains (No. 922), and in Wood Cañon, Grapevine Mountains (No. 1759). Our plants do not agree with Pursh's description in all respects, but they belong rather to the type form than to any of the varieties indicated by Gray in the Synoptical Flora.

Pentstemon labrosus (Gray) Bot. Cal. i. 622 (1876), as *P. barbatus labrosus;* Hook. f. Bot. Mag. cx. t. 6738 (1884). Type locality, "on Mount Pinos [California], south of Tejon, at 7,000 feet."

Frazier Mountain (No. 1206).

Pentstemon lætus Gray, Proc. Bost. Soc. Nat. Hist. vii. 147 (1859). Type locality, near "Fort Tejon," California.

Near Caliente (No. 1096).

Pentstemon newberryi Gray, Pac. R. Rep. vi. pt. iii. 82 (1857). Type locality, "on rocks, forming broad tufts near Mount St. Joseph's, N. California."

In the high Sierra Nevada (Nos. 1494, 1832, 2088).

Pentstemon palmeri Gray, Proc. Amer. Acad. vii. 379 (1868). Type localities, "Arizona, in Skull Valley, and on Rio Verde, near Fort Whipple."

Near Crystal Spring, Coso Mountains (No. 919), and near Callville, Nevada (No. 1902).

Pentstemon ternatus Gray, Bot. Mex. Bound. 115 (1859)—Torr. MS. Type locality, "mountains east of San Diego."

Near Fort Tejon (No. 1167).

Collinsia bicolor Lindl. Bot. Reg. xx. t. 1734 (1834). Type locality, "California."

In the valley of Kings River (No. 1858).

Collinsia parryi Gray, Syn. Fl. ii. pt. i. 257 (1878). Type locality, "San Bernardino Co., southeastern California."

Near Willow Creek, Panamint Mountains (No. 750). Our specimens, like those collected by Pringle in 1882 on "hills bordering the Mohave Desert," have the stem glabrous and glaucous below, but above, like the pedicels and calyx, sparingly glandular-hairy, and only 3 or 4 ovules in each cell.

Collinsia parviflora Lindl. Bot. Reg. xiii. t. 1082 (1827). Type locality "in the vicinity of the river Columbia."

Near Mineral King in the Sierra Nevada (Nos. 1520, 1569).

Collinsia tinctoria Benth. Pl. Hartw. 328 (1849)—Hartw. MS. Type locality, "in montibus Sacramento."

In the Tejon Mountains (No. 1174).

Collinsia torreyi Gray, Proc. Amer. Acad. vii. 378 (1868). Type localities, "Mariposa, Big-tree Grove, and near Donner Lake," California.

Near Mammoth, Mono County, California (No. 1820).

Collinsia wrightii Wats. Proc. Amer. Acad. xxiv. 84 (1889). Type locality, "on the Greenhorn Mountains, Kern County, California, at 6,000 to 7,000 feet altitude."

Between Mineral King and Farewell Gap (No. 1566). Our specimens, which are not yet in mature fruit, have corollas 7 to 9 mm. long. In the type specimens, which were in full fruit, they are of only about one-third this length and are undoubtedly abnormally small, as corollas on old plants often are.

Mimulus breweri (Greene) Bull. Cal. Acad. i. 101 (1885), under *Eunanus*. Type locality, "about Donner Lake," California.

Near Mineral King (No. 1456).

Mimulus cardinalis Lindl. Trans. Hort. Soc. Lond. ser. 2. ii. 70 (1842)—Dougl. MS. Type locality Californian.

On the eastern slope of the Inyo Mountains (No. 1785), and near Yosemite (No. 1855).

Mimulus deflexus Wats. Proc. Amer. Acad. xxiv. 84 (1889). Type locality, "on the drier edges of low wet places in Long Meadow, Tulare Co., California."

Near Big Cottonwood Meadows, Sierra Nevada (Nos. 2139, 2140). In the vicinity of Whitney Meadows and Dutcher's camp this species grew abundantly on granitic soil in open woods. Two forms occurred, conspicuous for differences in the coloration of their corollas. One form, No. 2140, has flowers, as originally described, yellow with purple dots in the throat and a purple upper lip. The other, represented by No. 2139, differs from the typical form in having the upper lip also yellow. No intergrades in coloration were seen.

Mimulus floribundus Lindl. Bot. Reg. xiv. t. 1125 (1828). Type locality, "on moist rocks in the interior of the districts of the river Columbia."

Near Three Rivers (No. 1288) and Kernville (No. 2157).

Mimulus leptaleus Gray, Proc. Amer. Acad. xi. 96 (1876). Type locality, "gravelly soil, in the Sierra Nevada, California, at 5,000 feet and upwards, south of the Yosemite, and in Sierra County."

In the high Sierra Nevada (Nos. 1625, 2125), and in the White Mountains (No. 1798). The corollas of these specimens are larger than in the type specimens, reaching a length of 14 to 18 mm., but the same plant collected in the high Sierras by both Matthews and Rothrock has been referred here by Dr. Gray.

Mimulus lewisii Pursh, Fl. ii. 427 (1814). Type locality, "on the head springs of the Missouri, at the foot of Portage hill."
Near Mammoth (No. 1828) and near Yosemite (No. 1856), both in the Sierra Nevada.

Mimulus luteus L. Sp. Pl. ed. 2. ii. 884 (1762). Type locality, "in Peru."
In the Funeral (No. 330), Panamint (No. 707), and Argus (No. 740) mountains, and near Lone Pine (Nos. 896, 899).

Mimulus luteus alpinus Gray, Proc. Acad. Phila. 1863, 71 (1863). Type locality, "alpine region" of the Rocky Mountains.
In the high Sierra Nevada (Nos. 1527, 2111, 2116).

Mimulus mephiticus Greene, Bull. Cal. Acad. i. 9 (1885). Type locality, "Sierra Nevada, in the Yosemite region and northward."
Black Cañon, White Mountains (No. 1792).

Mimulus moschatus longiflorus Gray, Syn. Fl. ii. pt. i. 278 (1878). Type locality Californian.
Sequoia Park (No. 2097).

Mimulus nanus Hook. & Arn. Bot. Beech. 378 (1840–41). Type locality Californian, but not specifically given.
Valley of Big Cottonwood Creek, Sierra Nevada (No. 2137).

Mimulus nasutus Greene, Bull. Cal. Acad. i. 112 (1885). Type locality, "in Sonoma County, Cal., at Knight's Valley and Skaggs' Springs."
Near Mineral King, Sierra Nevada (No. 1457).

Mimulus palmeri Gray, Proc. Amer. Acad. xii. 82 (1876). Type locality, "S. E. California, on the Mohave River."
Near Kernville (No. 1038).

Mimulus pilosus (Benth.) Comp. Bot. Mag. ii. 57 (1836), under *Herpestis;* Wats. Bot. King Surv. 225 (1871). Type locality, "North California."
Near Kernville (No. 1039), and along Poso Creek (No. 1248).

Mimulus primuloides Benth. Scroph. Ind. 29 (1835). Type locality, "Amer[ica] boreali-occid[entali]."
Near Mineral King (No. 1474).

Mimulus rubellus Gray, Bot. Mex. Bound. 116 (1859). Type locality, "wet ravines of the Organ mountains and Copper mines," New Mexico.
In the Panamint (Nos. 637, 2021) and Grapevine (No. 1768) mountains, and in the Sierra Nevada (No. 1524).

Diplacus glutinosus Nutt. Bot. Mag. under t. 3655 (1838).
The *Diplacus* found at many points on the western slope of the Sierra Nevada is supposed to be of this species. No specimens were collected.

Ilysanthes gratioloides (L.) Sp. Pl. ed. 2. ii. 876 (1762), under *Capraria;* Benth. in DC. Prodr. x. 419 (846). Type locality, "in Virginiæ aquosis."
Near Visalia (No. 1261).

Limosella aquatica L. Sp. Pl. ii. 631 (1753). Type locality European.
Between Trout Meadow and Kern River, Sierra Nevada (No. 1586).

Veronica americana Benth. in DC. Prodr. x. 468 (1846)—Schweinitz MS. Type locality not given; range, "in America boreali a Canada et Carolina usque ad flum[en] Oregon et in ins[ula] Sitcha."
On Frazier Mountain (No. 1205) and in the White Mountains (No. 1808).

Veronica alpina L. Sp. Pl. i. 11 (1753). Type locality European.
Near Mineral King (No. 1560).

Veronica serpyllifolia L. Sp. Pl. i. 12 (1753). Type locality, "in Europa & America septentrionali ad vias, agros."
In the high Sierra Nevada (Nos. 1471, 1621, 1816, 2129).

Castilleia affinis Hook. & Arn. Bot. Beech. 154 (1833). Type locality either near San Francisco or near Monterey.
Tejon Mountains (No. 1178).

Castilleia miniata Benth. in Hook. Fl. Bor. Amer. ii. 106 (1838)--Dougl. MS. Type locality, "Blue Mountains [Oregon], N. W. America."
Valley of the Kaweah River (No. 1357).

Castilleia minor Gray, Bot. Mex. Bound. 119 (1859), as *C. affinis minor;* Gray Bot. Cal. i. 573 (1876). Type locality, "bed of exsiccated streams, near the Copper mines, New Mexico."
Near Trout Meadows, Sierra Nevada (No. 1583). The specimens seem to be identical with those of No. 236, Wheeler Survey. Both have a galea comparatively longer than in typical *C. minor*, and a lip longer and less callous than in that species. They may be reduced specimens of *C. stenantha.*

Castilleia parviflora Bong. Veg. Sitch. 158 (1831). Type locality Sitkan.
In the Funeral Mountains (No. 327), Panamint Mountains (No. 551), and Sierra Nevada (No. 1390).

Orthocarpus lacerus Benth. Pl. Hartw. 329 (1849). "In valle Sacramento."
Granite Creek, Sierra Nevada (No. 1839). These specimens are unusually small and most of their leaves are entire.

Orthocarpus purpurascens palmeri Gray, Syn. Fl. ii. pt. i. 300 (1878). Type locality, "Arizona, near Wickenberg."
Leach Point Spring (No. 1869).

Adenostegia rigida brevibracteata (Gray) Bot. Cal. i. 622 (1876), as *Cordylanthus filifolius brevibracteatus;* Greene, Pittonia, ii. 180 (1891). Type locality, "near Soda Spring on Kern River [Tulare County, California] at 8,500 feet."
Near Soda Springs, Sierra Nevada (No. 1602). In our specimens the stems are not glabrous as described, but puberulent, like the common form of the species.

Pedicularis attollens Gray, Proc. Amer. Acad. vii. 384 (1868). Type locality, "swamps in the Sierra Nevada, alt. 6–11,000 feet."
In the Sierra Nevada (Nos. 1526, 1835).

Pedicularis grœnlandica Retz. Fl. Scand. ed. 2.145 (1795). Type specimen from Greenland.
In the high Sierra Nevada (Nos. 1434, 1571).

Pedicularis semibarbata Gray, Proc. Amer. Acad. vii. 385 (1868). Type localities, "on Mount Dana, alt. 10,000 feet," "Ebbett's Pass, 7,000 to 8,000 feet," "in or near the Yosemite Valley," "and Mariposa Grove, at and above 5,000 feet."
Near Mineral King, Sierra Nevada (No. 1385).

OROBANCHACEÆ.

Aphyllon californicum (Cham. & Schlecht.) Linnæa, iii. 134 (1828), under *Orobanche;* Gray, Bot. Cal. i. 584 (1876). Type locality, "vicinia portus St. Francisci Californiae."

Near Fort Tejon (No. 1159).

Aphyllon cooperi Gray, Proc. Amer. Acad. xx. 307 (1885). Type locality, "at Fort Mohave," Arizona.

Between Furnace Creek and Ash Meadows (Nos. 344, 434).

Aphyllon fasciculatum (Nutt.) Gen. ii. 59 (1818), under *Orobanche;* Torr. & Gr. in Gray, Man. ed. 2. 281 (1856). Type locality, "around Fort Mandan," North Dakota.

Collected on the Darwin Mesa (No. 796), growing on *Artemisia tridentata.*

LENTIBULARIACEÆ.

Utricularia minor L. Sp. Pl. i. 18 (1753). Type locality European.

Whitney Meadows (No. 1635). The specimens have no flowers nor fruit.

Utricularia vulgaris L. Sp. Pl. i. 18 (1753). Type locality European.

In one of the Kern River Lakes (No. 1725).

BIGNONIACEÆ.

Chilopsis linearis (Cav.) Ic. Pl. iii. 35 (1794), under *Bignonia;* DC. Prodr. ix. 227 (1845). Type locality unknown.

Found along the Mohave River at Daggett; at Cave Wells, Ivawatch Mountains (T. S. Palmer); on the eastern slope of the Charleston Mountains between Mountain Springs and Cottonwood Springs; in the vicinity of Cottonwood Springs; at the mouth of the Vegas Wash; and near Callville, Nevada (No. 1903). Dr. Merriam found it at Bitter Springs, in the Muddy Mountains, Nevada; at the junction of Beaverdam Creek and the Virgin River, in Arizona; on the eastern slope of the Beaverdam Mountains, Utah; and in the lower Santa Clara Valley, Utah. This plant grows near streams or springs, or in their dried beds.

VERBENACEÆ.

Lippia nodiflora (L.) Sp. Pl. i. 20 (1753), under *Verbena;* Mx. Fl. ii. 15 (1803). Type locality, "in Virginia."

Near Visalia (No. 1254).

Verbena bracteosa Mx. Fl. ii. 13 (1803). Type locality, "in regione Illinoensi et in urbe Nash-ville."

Near Lone Pine (No. 953).

Verbena prostrata R. Br. in Ait. Hort. Kew. ed. 2. iv. 41 (1812). Type locality, "North West Coast of America."

Near Keene, on the western slope of Tehachapi Pass (No. 1110).

LABIATÆ.

Mentha canadensis L. Sp. Pl. ii. 577 (1753). Type locality, "in Canada."

Near Visalia (No. 1264) and in the Yosemite Valley (No. 1852).

Monardella lanceolata Gray, Proc. Amer. Acad. xi. 102 (1876). Type locality, "California, from Plumas to San Diego Co."

Near Havilah (No. 1093) and near Tehachapi (No. 1113).

Monardella linoides Gray, Proc. Amer. Acad. xi. 101 (1876). Type locality, "S. California, in the mountains east of San Diego."

Wild Rose Cañon, Panamint Mountains (No. 2015).

Monardella odoratissima Benth. Lab. 332 (1834). Type locality, "in America boreali-occidentali: in petrosis ad flumen Columbia et in rupibus alpestribus in montibus White Mountains dictis."

In the high Sierra Nevada (Nos. 1616, 2158).

Monardella villosa glabella Gray, Proc. Amer. Acad. vii. 386 (1868). Type locality Californian.

Near Mineral King, Sierra Nevada (No. 1386).

Salvia carduacea Benth. Lab. 302 (1833). Type locality, "in California." Observed only in Antelope Valley both east and west of Willow Spring, within the limits of the true desert vegetation.

Salvia carnosa Dougl. in Lindl. Bot. Reg. xvii. t. 1469 (1831). Type locality, "on the plains of the Columbia near Priest's Rapid, and on clayey hills near the Big Birch."

This shrubby mint, the *Audibertia incana* of most authors, was recorded from near Hesperia (No. 51); on the Panamint Mountains, in Johnson Cañon, Surprise Cañon (No. 601), Willow Creek Cañon, and Mill Creek Cañon; and in Tehachapi Pass. It belongs to the lower altitudes of the Upper Sonoran zone, descending rarely, under favorable conditions, a little lower, and is a common and characteristic plant in its proper belt.

Specimens collected on the east slope of Walker Pass (No. 1015), and near Panaca, Nevada (No. 1985), belong to Gray's *Audibertia incana pilosa*. This plant when not in flower so nearly resembles the type form of *Salvia carnosa* that it is readily confounded with that plant. Among the nut pines on the eastern slope of the Panamints occurred another related plant, distinguished by its conspicuously larger leaves, which is probably referable to Gray's *Audibertia incana pachystachya*. Both these plants appear to have good specific characters, and will probably be found distinct.

Salvia columbariæ Benth. Lab. 302 (1833). Type locality, "in California." Observed in the upper altitudes of the Lower Sonoran zone throughout the region traversed. Specimens were collected in Johnson Cañon, Panamint Mountains (Nos. 492, 534).

Salvia mellifera Greene, Pittonia, ii. 236 (1892). Type locality,[1] "in California septentrionali."

In the San Bernardino Valley, commonly known as black sage. This is the *Audibertia stachyoides* of Bentham.

Salvia mohavensis Greene, Pittonia, ii. 235 (1892). Type locality,[2] "summit of Providence Mountain, Mohave Desert," California.

In the Funeral Mountains, near Saratoga Springs (No. 261). This species, under the name *Audibertia capitata*, has been known heretofore only in the Providence Mountains.

Ramona polystachya (Benth.) Lab. 314 (1833), under *Audibertia;* Greene, Pittonia, ii. 235 (1892). Type locality, "in California septentrionali."

Near San Bernardino (No. 104), locally known as white sage.

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[1] Benth. Lab. 313 (1833).

[2] Proc. Amer. Acad. vii. 387 (1868).

Lophanthus urticifolius Benth. Bot. Reg. xv. under t. 1282 (1829). Type locality, "the north-west coast of America."

Near Mineral King, Sierra Nevada (No. 1469).

Salazaria mexicana Torr. Bot. Mex. Bound. 133 (1859). Type locality, "ravines, Chihuahua, below Presidio del Norte, near the Rio Grande."

The shrub was observed near Hesperia (No. 46); a few miles north of Daggett; on the northeast slope of Lone Willow Peak; in the northern end of Resting Springs Valley; in a cañon of the Funeral Mountains, west of Amargosa; on the divide between Furnace Creek and Ash Meadows; between the latter point and Pahrump Valley; on the western and eastern foot-slopes of the Charleston Mountains; in the northern part of Vegas Valley; between Towner's and Ash Meadows; in Johnson, Surprise, Willow Creek, and Mill Creek (No. 756) cañons, Panamint Mountains; along the foot of the Inyo Mountains, near Swansea (No. 867); near Crystal Spring, Coso Mountains; on the east slope of Walker Pass; in Tehachapi Cañon, and between Mohave and Willow Spring. The plant is characteristic of the higher altitudes of the Lower Sonoran zone, seldom occurring below 600 meters, and reaching a little higher than *Larrea*. Dr. Merriam reported it from Gold Mountain, Muddy Mountains, and Oasis, Indian Spring, and Pahranagat valleys, Nevada, and the Santa Clara Valley and Beaverdam Mountains, Utah.

Scutellaria angustifolia Pursh, Fl. ii. 412 (1814). Type locality, "on the river Kooskoosky," now the Clearwater, in Idaho.

Frazier Mountain (No. 1197).

Prunella vulgaris L. Sp. Pl. ii. 600 (1753). Type locality European.

Yosemite Valley (No. 1849). The generic name is commonly spelled *Brunella*.

Marrubium vulgare L. Sp. Pl. ii. 583 (1853). Type locality European.

This plant, the horehound, is a common weed in southern intramontane California. It approaches the desert at many points, but does not enter it. We observed it in the San Bernardino Valley; at the summit and on the south slope of Cajon Pass; in the western end of Antelope Valley; throughout the Tulare Plains; along the road between Kernville, Caliente, and Tehachapi; and between Visalia and Three Rivers.

Stachys albens Gray, Proc. Amer. Acad. vii. 387 (1868). Type localities, "Fort Tejon," "Ojai," "Pechecos Pass," and "Yosemite Valley," all in California.

In the valley of the Kaweah River (No. 1342), in Owens River Valley (No. 1772), and on the east slope of the Inyo Mountains (No. 1784).

Trichostema lanceolatum Benth. Lab. 659 (1835). Type localities, "in America boreali-occidentali prope arcem Vancouver, in siccis ad fluvium Multnomah, et in Nova California."

Near Three Rivers (No. 1284).

PLANTAGINACEÆ.

Plantago major L. Sp. Pl. i. 112 (1753). Type locality European.

In Vegas Valley, Nevada (No. 390). The plant was evidently introduced.

Plantago patagonica gnaphaloides (Nutt.) Gen. i. 100 (1818), as *P. gnaphaloides*; Gray, Pac. R. Rep. iv. 117 (1857). Type locality, "on the summits of high and gravelly hills; commencing to appear near the confluence of the river Jauke and the Missouri."

This plant was published[1] in another place in the same year as *P. purshii*. It is common throughout the desert region in the Lower Sonoran zone. Specimens were collected near Resting Springs (No. 340), in Panamint Valley (No. 678) and in the valley of the Virgin River, Nevada (No. 1912). It was not observed in intramontane California.

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[1] R. & S. Syst. Veg. iii. 120 (1818).

NYCTAGINACEÆ.

Mirabilis frœbellii (Behr) Proc. Cal. Acad. i. 69 (1855), under *Oxybaphus;* Greene Bull. Cal. Acad. i. 124 (1885). Type specimens, "culta e seminibus a J. Frœbel prope Warner's Ranch lectis." Warner's ranch was an old stage station on the wagon road between Fort Yuma and San Diego, about 5 kilometers west of the present station of Aguas Calientes, San Diego County, California.

The plant occurred in Willow Creek Cañon, Panamint Mountains (No. 761); between Keeler and Crystal Spring; near Indian Wells; abundantly in Antelope Valley, west of the yucca belt; and in the southern part of the Tulare Plains. From the data furnished by the expedition, the zonal position neither of this plant nor of *M. multiflora* is clear.

Mirabilis lævis (Benth.) Bot. Sulph. 44 (1844), under *Oxybaphus;* Curran, Proc. Cal. Acad. ser. 2. i. 235 (1889). Type locality, "Bay of Magdalena."

The plant of the Mohave Desert region, our No. 741, which may be distinct, has white flowers, while its intramontane representative, our No. 1018, has red flowers and more nearly spherical fruit. Both have passed under the name *M. californica,* but the specific name *lævis* is older.

The species was recorded at Resting Springs; in the northern end of Resting Springs Valley; near Winters's ranch, Pahrump Valley; in the Funeral Mountains, west of Amargosa; in Johnson, Surprise, and Willow Creek cañons, Funeral Mountains; in Shepherd Cañon, Argus Mountains (No. 741); in a cañon of the Inyo Mountains, near Swansea; between Keeler and Crystal Spring; at St. George (No. 1956); and on Sarcobatus Flat, west side of the Ralston Desert, Nevada (No. 1996). At all these stations which lie well within the desert, the flowers of the plant whenever they were seen were white. The red-flowered form was observed on the east slope of Walker Pass (No. 1018), and at the western end of Tehachapi Cañon.

Mirabilis multiflora (Torr.) Ann. Lyc. N. Y. ii. 237 (1828), under *Oxybaphus;* Gray, Bot. Mex. Bound. 169 (1859). Type locality, "about the Forks of the Platte."

Specimens were observed near Caliente, Kern County, California, and at Beaverdam, Arizona (No. 1937).

Bœrhavia annulata sp. nov. PLATE XVIII.

Perennial; stem erect from an ascending base, 0.5 to 1 meter high, leafy below, branched above, glabrous and glaucous, but the middle of each internode provided with a reddish brown ring 1 to 2 cm. long, exuding a viscous fluid; leaves with ovate-oblong, thick blades 2 to 5 cm. long, obtuse or cordate at the base, obtuse or very bluntly acute at the apex, green above, much paler beneath, hirsute with weak hairs, their pulvilli glanduliform and dark purple, veins prominent beneath; petiole nearly as long as the blade, hirsute near the apex; bracts of the inflorescence minute, ovate-lanceolate, ciliate; flowers in clusters of 2 to 5 terminating the branches, 7 to 9 mm. long; involucral bracts minute, similar to those of the inflorescence; ovary glabrous; calyx tube one-half as long as the throat, villous with divergent but reflexed, long, weak hairs, the throat funnelform and glabrous; stamens 3 and, like the style, exserted; fruit about 5 mm. long, narrowly oblong-pyriform, glabrous, barely angulate by several ribs, obtuse at the apex.

Type specimen in the United States National Herbarium, No. 577, Death Valley Expedition; collected April 8, 1891, in Furnace Creek Cañon, Funeral Mountains, Inyo County, California, by Frederick V. Coville.

The species is most nearly related to *B. erioslena* of Torrey, but differs from that species, among other characters, in the much narrower throat of the calyx, and fruit with rounded apex, that species having an almost rotate calyx-throat, and turbinate, truncate fruit. The two species agree in the viscidity of the middle part of their internodes.

The plant was first seen January 20, 1891, as we descended Long Valley, on the morning of our entrance into Death Valley. The few specimens growing there had put out a few large, radical leaves, but had not yet flowered. In this condition the appearance of the plant strongly suggests a begonia. It was next met with in a cañon on the west slope of the Funeral Mountains, opposite Bennett Wells, and again, January 27, in Furnace Creek Cañon, where it was collected later in the season (No. 577). It was seen afterwards in but one locality, on the steep mesa between Hot Springs, in Panamint Valley, and the mouth of Surprise Cañon.

Selinocarpus diffusus Gray, Amer. Journ. Sci. ser. 2. xv. 262 (1853). Type locality, "rocky hills and valleys from the Pecos to the Limpio."

Collected at Overton, Nevada (No. 1932). In our plant, as in a portion of the type specimen, all the calyces have remained undeveloped with a length of only 2 or 3 mm., while the normal length of a fully developed calyx is about 30 mm. Noting this peculiarity, Dr. Gray wrote, with the original description, "The unopened perigonium of the precociously fructified flowers, which usually persists until the fruit is ripe, does not exceed a line in length; while the fully developed flowers are an inch and a half long."

Abronia fragrans Nutt. loc. indet.

At Cottonwood Springs, Vegas Valley (No. 1886).

Abronia nana Wats. Proc. Amer. Acad. xiv. 294 (1879). Type locality, "near Beaver City, S. Utah, in dry ravines among junipers."

In the Inyo Mountains (No. 1782). This plant has the low, cespitose habit, branched caudex, and other characters of this species, but the bracts of the involucre are somewhat smaller. The lack of fruit in both this and the type specimen renders the identification uncertain.

Abronia pogonantha Heimerl in Engler, Bot. Jahrb. xi. 87 (1890). Type locality, "in California australi 'sandy banks of the Mojave River.'"

In addition to the type specimens (No. 345, Parish Brothers, 1882) the plant was collected in the same locality in 1881 (No. 1150, Parish Brothers) and has been since found in the Mohave Desert by S. B. Parish (No. 1916 of 1887), in Antelope Valley, by J. C. Oliver (specimen in the Gray herbarium), and now in the Tulare Plains near Bakersfield (No. 1239 of the present collection).

Abronia turbinata Wats. Bot. King Surv. 285 (1871)—Torr. in herb. Type locality not specifically given; range, "from New Mexico and Arizona to southern California (?) and Nevada."

Near Keeler (No. 845), and near Crystal Spring, in the Coso Mountains (No. 939). These specimens differ from the typical plant in their smaller, wingless fruit, short, ovate involucral bracts, and broadly obtuse leaves.

Abronia villosa Wats. Amer. Nat. vii. 302 (1873). Type locality, "Arizona."

This plant was collected near Saratoga Springs (Nos. 250, 251) and in the Vegas Wash (No. 425), growing in dry, loose sand.

ILLECEBRACEÆ.

Achyronychia cooperi Torr. & Gr. in Gray, Proc. Amer. Acad. vii. 331 (1868). Type locality, "in dry sand, Mohave River, at Camp Cady," California.

Between Bennett Wells and the Eagle Borax Works, Death Valley (No. 288); north of the latter place (No. 473); and in Hall Cañon at the western base of the Panamint Mountains. All these localities are in very hot and arid portions of the Lower Sonoran zone.

AMARANTACEÆ.

Amarantus albus L. Sp. Pl. ed. 2. ii. 1404 (1762). Type locality, "in Philadelphiæ maritimis."

An *Amarantus* identified in the field as *A. albus* was found at a few points in the desert: Ash Meadows, Nevada; Corn Creek, Vegas Valley, Nevada; Johnson Cañon, Panamint Mountains; and frequently along our route in the southern Sierra Nevada between Walker and Tehachapi passes. In all these places it occurred as a weed in cultivated soil or in moist areas about camping places. The ordinary soil of the desert was altogether too arid for it.

Cladothrix oblongifolia Wats. Proc. Amer. Acad. xvii. 376 (1882). Type localities, "on the banks of the Colorado, near Chimney Peak," "at Yuma," and "in the Mohave Desert."

This plant has been considered an annual, like *C. lanuginosa*, but the base of the stem often persists for several years. In one of our specimens this woody trunk has a diameter of 12 mm. and shows five well-defined annular layers. It is to be noted, therefore, that this species closely resembles *C. suffruticosa*, which is known only from imperfect specimens collected by Charles Wright in 1849 in the valley of the Rio Grande.

The species occurred on the washes and gravel slopes of Death Valley (No. 194), from Furnace Creek to Saratoga Springs; at several points in Resting Springs Valley; at Ash Meadows; in the Vegas Wash; and in Hall and Surprise cañons, Panamint Mountains. The plant is characteristic of the lower altitudes of the *Larrea* belt.

CHENOPODIACEÆ.

Monolepis spathulata Gray, Proc. Amer. Acad. vii. 389 (1868). Type locality, "Sierra Nevada, at Mono Pass," California.

Willow Creek Cañon, Panamint Mountains (No. 812).

Chenopodium album L. Sp. Pl. i. 219 (1753). Type locality European.

No. 813, collected with the preceding.

Chenopodium californicum Wats. Proc. Amer. Acad. ix. 101 (1874), under *Blitum;* Wats. Bot. Cal. ii. 48 (1880). Type locality, "California, from the Sacramento to Fort Tejon and San Diego."

This was seen only in the southern Sierra Nevada at several points along our route between Kernville and Tehachapi, growing in, or somewhat below, the chaparral belt. Specimens were collected between Kernville and Havilah (No. 1059).

Chenopodium fremonti Wats. Bot. King Surv. 287 (1871). Type locality, as taken from Fremont's specimen, "on the North Platte."

In Willow Creek Cañon, Panamint Mountains (No. 815).

Chenopodium murale L. Sp. Pl. i. 219 (1753). Type locality European.

This plant was recorded in the desert from Furnace Creek Ranch (Nos. 243, 573); from Resting Springs Mine, from the vicinity of Keeler, and from Havilah. At all these points it grew as a weed near places of human habitation and in soil moister than that of the open desert. It is one of the very few introduced weeds that have penetrated the American desert.

Atriplex argentea Nutt. Gen. i. 198 (1818). Type locality, "on sterile and saline places near the Missouri."

On the shore of Owens Lake (No. 873), about Tehachapi Lake (No. 1129), and near Tulare (No. 1251). Our specimens are below the southern limit of the species, as defined by Watson,[1] yet they do not, apparently, belong to his *A. expansa.*

Atriplex canescens (Pursh) Fl. ii. 370 (1814), under *Calligonum;* James, Cat. 178 (1825). Type locality, "in the plains of the Missouri near the Big-bend." Nuttall states[2] that Pursh's specimens "must have been in the collection of Lewis and Clark, as I did not meet with it on the borders of the Missouri."

This species occurs, often only sparingly in certain localities, throughout the Upper and Lower Sonoran zones in the whole desert region traversed by the expedition. In the southern portion of the Mohave Desert region it rarely forms an important part of the desert vegetation. Specimens were collected on the south slope of Browns Peak (No. 180) and in Surprise Cañon, Panamint Mountains (No. 724).

Atriplex confertifolia (Torr. & Frem.) in Frem. Second Rep. 318 (1845), under *Obione;* Wats. Proc. Amer. Acad. ix. 119 (1874). Type locality, "on the borders of the Great Salt lake."

This species is also an abundant one in nearly all the valleys of the desert region. It was collected between Stoddard Wells and Daggett, California (No. 134), and at Pigeon Spring, Esmeralda County, Nevada (No. 2012).

Atriplex fasciculata Wats. Proc. Amer. Acad. xvii. 377 (1882). Type locality, "near Fish Ponds, Mohave Desert," California.

Between Darwin and Keeler (No. 903). This species has not before been reported since its discovery.

Atriplex hastata L. Sp. Pl. ii. 1053 (1753). Type locality European.

About Tehachapi Lake (No. 1128). The specimens collected were very young, but they undoubtedly belong to this species. The leaves are opposite, ovate-deltoid to ovate-hastate, and usually dentate.

Atriplex hymenelytra (Torr.) Pac. R. Rep. iv. 129 (1857), under *Obione;* Wats. Proc. Amer. Acad. ix. 119 (1874). Type locality, "hills and gravelly places, on Williams' River," Arizona.

This greasewood was recorded between Stoddard Wells and Daggett (No. 137); at several points between Daggett and Lone Willow Spring; in Windy Gap; in Long Valley; at many points in the bottom of Death Valley (No. 195), from Furnace Creek to Saratoga Springs; in Resting Springs Valley; at several points in the Funeral Mountains; in Pahrump Valley; in Vegas Wash; between Towner's and Ash Meadows; near Keeler; and between the latter point and Darwin. The species is characteristic of the Lower Sonoran zone, growing upon soil that is in part alkaline, but not sufficiently so to effervesce, and in part gravelly, conditions that are often found in desert washes. Dr. Merriam has reported it in the valleys of the Virgin and Muddy rivers, Nevada.

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[1] Proc. Amer. Acad. ix. 115 (1874).

[2] Pl. Gamb. 184 (1848).

Atriplex lentiformis (Torr.) Sitgr. Rep. 169 (1854), under *Obione;* Wats. Proc. Amer. Acad. ix. 118 (1874). Type locality, "on the Colorado of California."

This species occurred along the bed of the Amargosa at Saratoga Springs; near Resting Springs (Nos. 264, 265); at the mouth of the Vegas Wash (No. 303); and in the Tulare Plains south of Bakersfield (No. 1238). Dr. Merriam and Mr. Bailey found it also in Oasis Valley, Pahranagat Valley, and the valleys of the Virgin and Muddy, Nevada, and in the Santa Clara Valley, Utah. In the southern end of Resting Springs Valley a specimen was seen 4.52 meters long, partly reclining, with a trunk 30 cm. in circumference.

Atriplex parryi Wats. Proc. Amer. Acad. xvii. 378 (1882). Type locality, "near Colton, California." This locality is undoubtedly incorrect, for the type specimens without question came from the opposite side of the San Bernardino Mountains.

This little known species of greasewood appears not to have been recorded from any place since its first collection, but a part of the National Herbarium specimen of Parish Brothers' No. 1350, of 1882, from "Rabbit Springs, Mojave Desert," is the same.

It was first met with at Saratoga Springs, Death Valley, and until the fruit was examined it was taken to be a peculiar form of *Atriplex confertifolia*. As we afterward became familiar with the plant it could be readily distinguished from that species not only by the form of the leaves, but also by its general appearance in the winter state. It is smaller than *A. confertifolia*, has a more evenly rounded form, and bears much more numerous and slenderer branches. The species occurred at Resting Springs (No. 274); at Ash Meadows (No. 439); about an alkaline dry lake between Ash Meadows and Towner's ranch; on the mesa east and north of Keeler (No. 843); on the west shore of Owens Lake; and north of Searles's, along the margin of the borax flat. In all these localities it occurred abundantly, growing about alkaline lakes or along alkaline stream-beds and usually at a sufficient distance from them to obtain a dry top-soil of drifting sand. Dr. Merriam and Mr. Bailey reported it in Oasis Valley, Grapevine Cañon, and Sarcobatus Flat, Nevada, and in Owens Valley, between Lone Pine and Big Pine, California.

Atriplex phyllostegia (Torr.) in Wats. Bot. King Surv. 291 (1871), under *Obione;* Wats. Proc. Amer. Acad. ix. 108 (1874). Type locality, "on dry foot-hills and near hot springs, between the Truckee and Humboldt Rivers, Western Nevada."

In the first publication cited above the authority for the species is given as Torrey, without reference to manuscript or herbarium, and there is no corroborative evidence in the book to show that the description was furnished by Torrey. But accompanying the type specimen in the National Herbarium are enlarged drawings of the dissected flowers and some notes in Dr. Torrey's handwriting. It is evident, therefore, that the description is his.

This was seen near Saratoga Springs (No. 302); at the Mitchell ranch, Resting Springs; near Twelve Mile Spring, Resting Springs Valley; at Ash Meadows (No. 370); and on the east shore of Owens Lake, near Keeler (No. 875). It may be expected almost anywhere in the desert in moist, alkaline, clayey soil, especially in spots where water may have stood during the spring rains.

Atriplex polycarpa (Torr.) Pac. R. Rep. iv. 130 (1857), under *Obione;* Wats. Proc. Amer. Acad. ix. 117 (1874). The name was first printed under *Obione*, without description, in Emory's Report, 149 (1848). Type locality, as taken from the specimen of the Pac. R. Rep., "hills and gravelly places, on Williams' River," Arizona.

This greasewood is the common and characteristic one in clayey valley bottoms throughout the Lower Sonoran zone of the desert. Specimens were collected on the south slope of Browns Peak (No. 181), and near Bennett Wells, in Death Valley (No. 196).

Atriplex torreyi Wats. Bot. King Surv. 290 (1871), under *Obione;* Wats. Proc. Amer. Acad. ix. 119 (1874). Type locality, "in the dry valleys bordering the Truckee and Carson Rivers," Nevada.

Atriplex torreyi was found at Resting Springs (No. 266); near Twelve Mile Spring, Resting Springs Valley; at Winters's ranch and other points in Pahrump Valley; at Ash Meadows; at several points in Vegas Valley; at the northern end of Owens River; near Walker's ranch, at the southern end of Owens Lake; between Olancha and Little Owens Lake; on the east slope of Walker Pass, at 1070 meters; and at Willow Spring, in Antelope Valley. Dr. Merriam found it also in Amargosa Cañon, California; valleys of the Virgin and Lower Muddy, and Pahranagat Valley, Nevada; and the Santa Clara Valley, Utah.

Atriplex tularensis sp. nov. PLATE XIX.

Annual, monœcious, white-scurfy throughout, erect, 20 to 40 cm. high, with a few opposite branches near the base (or simple), strict, the ends of the stem and branches inclined to be flexuous; lower leaves 1.5 to 2 cm. long, lanceolate, acuminate, tapering to an almost sessile base, 3- to 5-nerved, often with minute leaves fasciculate in their axils; upper leaves smaller, passing into the bracts of the inflorescence; flowers in small glomerules sessile in the axils of the leaves and passing above into a long, bracteate, interrupted spike, those of both sexes growing in the same glomerule; bracts similar to the leaves, but ovate, acute, and only 2 to 5 mm. long, calyx of male flowers 4-parted, a little less than 1 mm. long; fruit 3 to 3.5 mm. long, rhombic-ovate, usually acuminate, with 1 to 3 teeth on either margin above the middle, closely white-scurfy, the valves connate to the middle; seed 1 mm. in diameter.

Type specimen in the United States National Herbarium, No. 1235, Death Valley Expedition; collected July 13, 1891, on the Tulare Plains of California, about 25 kilometers south of Bakersfield, by Frederick V. Coville.

The long, erect, slender, leafy branches of this species give it a characteristic and graceful appearance.

Grayia spinosa (Hook.) Fl. Bor. Amer. ii. 127 (1838), under *Chenopodium;* Moq. in DC. Prodr. xiii. pt. ii. 119 (1849). Type locality, "interior of North California."

This shrub was found near Hesperia (No. 47); on the first divide north of Daggett; on Browns Peak; on Lone Willow Peak, from 790 meters to the summit; on the mountain slopes east of Resting Springs; on the divide between Resting Springs and Pahrump valleys; on the eastern and western slopes of the Charleston Mountains, beginning at about 1,000 meters; in the Funeral Mountains, west of Amargosa, from 975 meters to the summit; on the divide between Towner's and Ash Meadows; at many points in the Panamint Mountains (No. 615); near the summit station on the road from Mohave to Searles's; near Crystal Springs, in the Coso Mountains; between Lone Pine and Olancha; on the eastern slope of Walker Pass; near the mouth of Tehachapi Cañon; and in Antelope Valley. Dr. Merriam reported it in Deep Spring Valley, California; in Fish Lake Valley, between Gold Mountain and Mount Magruder, Sarcobatus Flat, Oasis, Timpahute, Pahranagat, Desert, and Meadow Creek valleys, and Pahroc Plain, Nevada; and in the Beaverdam Mountains and Santa Clara Valley, Utah. The shrub is characteristic of that portion of the Lower Sonoran zone which lies above the upper limit of *Larrea*, yet it often extends down into the *Larrea*, sometimes to the altitude of 800 or 1,000 meters.

Eurotia lanata (Pursh) Fl. ii. 602 (1814), under *Diotis;* Moq. Enum. Chenopod. 81 (1840). Type locality, "on the banks of the Missouri, in open prairies."

We first met with this plant on Browns Peak (No. 174) at an altitude of about 1,300 meters, in the upper part of the *Larrea* belt. On Lone Willow Peak single plants in sheltered localities were seen at 1,000 meters, but it was not abundant below 1,340 meters. It was recorded afterward on both slopes and the summit of the divide between Resting Springs Valley and Pahrump Valley; on the eastern and western foot-slopes of the Charleston Mountains, beginning at 1,280 meters; west of Amargosa, in the Funeral Mountains, from 1,100 meters to the summit, scarce at the lower altitude; on the divide between Pahrump and Ash Meadows; in the northern part of Vegas Valley; in Johnson, Willow Creek, and Mill Creek cañons, Panamint Mountains; near Crystal Spring, Coso Mountains; between Lone Pine and Olancha; near the mouth of Tehachapi Pass; and on the desert between Mohave and Willow Spring. It was collected by Mr. Bailey at Quartz Spring, Nevada (No. 1988). In the region examined the plant is widely scattered over the upper part of the *Larrea* belt, but extends also into the Upper Sonoran. Dr. Merriam reported it also in Deep Spring Valley, California; in Fish Lake Valley, Sarcobatus Flat, Oasis Valley, Emigrant Valley, Timpahute Valley, Pahroc Plain, Desert Valley, Meadow Creek Valley, and Juniper Mountains, Nevada; and in the valley of the Santa Clara, Utah.

Nitrophila occidentalis (Moq.) in DC. Prodr. xiii. pt. ii. 279 (1849), under *Banalia;* Wats. Bot. King Surv. 297 (1871). Type locality, "in Oregon."

This plant, characteristic of moist, alkaline soil, was observed at Saratoga Springs (No. 1875); at Resting Springs; at Ash Meadows; on the shores of Owens Lake, near Keeler; between Little Owens Lake and Walker Pass; between Tejon Ranch and Bakersfield; and near Visalia.

Kochia americana Wats. Proc. Amer. Acad. ix. 93 (1874). Type locality, "foothills and valleys from Northern Nevada to Southern Wyoming and southward to Arizona and Southern Colorado."

Between Keeler and Darwin (No. 905).

Kochia californica Wats. Proc. Amer. Acad. xvii. 378 (1882). Type localities, "near Colton, and at Rabbit Springs, San Bernardino County," California. The first of these two localities is undoubtedly incorrect.

At Ash Meadows, Nevada (No. 369). The species has been found before only in the State of California.

Allenrolfea occidentalis (Wats.) Bot. King Surv. 293 (1871), under *Halostachys;* Kuntze, Rev. Gen. Pl. 546 (1891). Type locality, "about Great Salt Lake [Utah] and in alkaline valleys westward to the sinks of the Carson and Humboldt rivers," Nevada.

As pointed out by Kuntze,[1] the name *Spirostachys* was originally applied by Ungern-Sternberg[2] to a plant of the Argentine Republic, but this name was afterwards[3] changed by the same author to *Heterostachys*. The name *Spirostachys* therefore reverts to this Argentine plant, and Watson's *Halostachys occidentalis*, which he afterward[4] changed to *Spirostachys occidentalis*, was left, together with two South American species, without a generic name. This Dr. Kuntze has supplied.

This plant was first seen by the expedition at the southern end of the salt-marsh in Death Valley when we entered it January 20, 1891. At this point the plant grows in patches upon hummocks of mixed sand and clay. Some of the larger hummocks are 1 meter high and 3 to 7 meters long, extending in a northerly and southerly direction, corresponding with the prevailing winds. They are undoubtedly formed by the drifting of sand among the branches of the *Allenrolfea* and the subsequent higher growth of the plant. Throughout the border of the salt-marsh in Death Valley the plant is abundant, and forms the characteristic line of extreme vegetation. Opposite Bennett Wells it grows uniformly over the ground, not in hummocks, for at this point there is no drifting sand. On the east side of the valley the gravel slopes at most points come directly down to the salt-marsh, and, in such situations, there is no line of *Allenrolfea*. It requires a moist clay soil well supplied, but not saturated, with alkali. About the bed of the Amargosa River, in the vicinity of Saratoga Springs, it was again seen in abundance. Outside of Death Valley and the valley of the Amargosa it was found only in the Vegas Wash, Nevada, at the sink of the stream; in the valley of the Virgin River, Nevada, below St. Thomas (No. 1921); about the alkaline lake near Hot Springs, Panamint Valley; and on a moist, alkaline flat in the Tulare Plains, between Tejon Ranch and Bakersfield (No. 1232).

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[1] Rev. Gen. Pl. 545, 546 (1891).

[2] Vers. Syst. Salicorn. 100 (1866).

[3] Atti Congr. Bot. Firenz. 273 (1876).

[4] Proc. Amer. Acad. ix. 125 (1874).

Salicornia ambigua Mx. Fl. i. 2 (1803). Type locality, "in Carolinæ scirpetis maritimis."

Near Bakersfield (No. 1234).

Salicornia herbacea L. Sp. Pl. 3 (1753), as *S. europæa herbacea;* L. Sp. Pl. ed. 2. i. 5 (1762). Type locality European.

About Tehachapi Lake (No. 1126).

Suæda intermedia Wats. Proc. Amer. Acad. xiv. 296 (1879). Type locality, "Utah and Arizona."

Near Bakersfield (No. 1230). The fruit of our specimens is not mature, and the reference of the plant to this species is based on the vegetative characters.

Suæda suffrutescens Wats. Proc. Amer. Acad. ix. 88 (1874). Type locality not given; range, "from Western Texas to Southern California and Northern Mexico, in saline plains."

In Death Valley (No. 193), near Saratoga Springs (Nos. 304, 305), and near Bakersfield (No. 1233). This plant is cited in the original description as including the earlier *Suæda fruticosa multiflora* Torr. It occurred in saline, slightly moist soil throughout the desert from the Colorado River to Owens Lake, and again in the Tulare Plains.

Suæda torreyana Wats. Proc. Amer. Acad. ix. 88 (1874). Type locality not given; range, "in alkaline soils from the North Fork of the Platte to Northern Nevada, and south to Northern Mexico and Southern California."

Near Lone Pine (No. 894). Our plant is identical with No. 998 of the King Survey. If the *Chenopodina moquini* of Torrey is really the same plant as Watson's, that specific name should be retained.

Sarcobatus baileyi Coville, Proc. Biol. Soc. Wash. vii. 77 (1892). Type locality as given below. PLATE XX.

"Shrub 0.5 to 1 meter high; bark dark gray after the first year; branches divaricate, closely interlocking, the ultimate branchlets always spinescent; leaves 8 to 14 mm. long or shorter, pubescent, especially near the apex, with short, flattened, branched, reflexed hairs, the later leaves often glabrate in age; male spike not seen; fertile spikes infra-axillary on old wood, consisting of 2 female flowers at the base (one often wanting), each in the axil of a leaf, and a terminal spiciform portion of male flowers, the whole axis 1 to 1.5 cm. long; fruit very large; body 8 to 9 mm. long, about 5 mm. broad at its widest point; wing oblong-orbicular, erose, 10 to 15 mm. by 8 to 10 mm. in diameter; seed not developed.

"The plant differs from *S. vermiculatus* in its smaller size, always spinescent branchlets, intricate and compact growth, smaller and usually pubescent leaves, larger fruit, and different inflorescence. *S. vermiculatus* usually grows, in Nevada, 1.2 to 1.8 meters high, with branches less intricate and often not spine-tipped, and leaves when well developed 12 to 20 or even 30 mm. long and almost invariably glabrous. Its fertile flowers are described by Bentham and Hooker as axillary and solitary, but the axis on which they are borne is really continued into a rudimentary male spikelet similar to that of *S. baileyi*, but each floral axis, instead of bearing 1 or 2 female flowers as in that species, commonly has from 4 to 8. In *S. vermiculatus* the body of the fruit is 4 to 5 mm. long, 2.5 to 3.5 mm. broad, and the wing 7 to 13 mm. by 5 to 8 mm. in diameter.

"Type specimen in the United States National Herbarium, No. 1994, Death Valley Expedition; collected June 2, 1891, in a valley near Thorpe's quartz-mill, Nye County, Nevada, by Vernon Bailey.

"The plant was first seen by Mr. Bailey at Cloverdale, Esmeralda County, Nevada, in 1890, and recognized by him as different from *S. vermiculatus*. In company with Dr. Merriam he afterwards found it in a valley in Nye County, Nevada, southeast by east from Gold Mountain, near Thorpe's quartz mill, and later in Fish Lake Valley (No. 2011), westward from the other localities, on the California State line. There is in the National Herbarium a specimen of the same plant collected by J. G. Lemmon in 1875, probably in western Nevada. The species is therefore confined, so far as known, to the counties of Esmeralda and Nye, in Nevada, and Mono and Inyo, in California. I take pleasure in associating Mr. Bailey's name with this shrub, both as a mark of his earnest and invaluable labors in the field of natural history and as a reminder of a warm friendship established among the vicissitudes of a desert exploration."

Some plants of *Sarcobatus* seen by the writer in winter along an old bank of Ash Meadows Creek, about a mile west of Watkin's ranch and very near the State line, probably belongs to this species.

Sarcobatus vermiculatus (Hook.) Fl. Bor. Amer. ii. 128 (1838), under *Batis;* Torr. in Emory, Rep. 149 (1848). Type locality, "on the barren grounds of the Columbia, and particularly near salt marshes."

This shrub occurred abundantly about the shores of Owens Lake, and at several points in the valley northward and southward. Along the route pursued by Dr. Merriam and Mr. Bailey in Nevada it occurred abundantly in Fish Lake Valley, Sarcobatus Flat, Oasis Valley, Pahranagat Valley, Meadow Creek Valley, Desert Valley, and along Shoal Creek, in Utah.

POLYGONACEÆ.

Eriogonum angulosum Benth. Trans. Linn. Soc. xvii. 406 (1837). Type locality, "California."

Near Crystal Springs, Coso Mountains (Nos. 909), and at the mouth of Tehachapi Cañon (Nos. 1133, 1134). In No. 1134 the flowers are ochroleucous instead of pink, and the three outer lobes of the calyx are inflated so as to appear very thick.

Eriogonum baileyi Wats. Proc. Amer. Acad. x. 348 (1875). Type localities, "in North-western Nevada," "in Owen's Valley [California]," and "in Arizona or Southern Utah."

On the east slope of Walker Pass (No. 1019), and on the road between Mohave and Willow Spring (No. 1137).

Eriogonum brachyanthum sp. nov.

Plant annual, 8 to 16 cm. high, diffusely branching from a point 1 to 4 cm. above the ground; stem (except for a distance of a few millimeters above the base) and branches glabrous and green; leaves all basal, lanate throughout, like the base of the stem, the orbicular blades 0.5 to 1.5 cm. in diameter, on a petiole slightly longer; bracts at the nodes ternate, brown, glabrous except the ciliate margins; involucres tubular-campanulate, 1.5 mm. long, ciliate in the throat, glabrous without; perianth 1 to 1.2 mm. long, greenish yellow, the outer divisions panduriform, the inner slightly shorter, linear-oblong, all glabrous.

Type specimen in the United States National Herbarium, No. 1013 of the Death Valley Expedition, collected June 21, 1891, a few miles north of Indian Wells, Inyo County, California, by Frederick V. Coville.

This species differs from *E. baileyi* in its smaller size and more diffusely branching habit, more uniformly green instead of purplish stems, shorter involucres, shorter flowers, and greenish yellow and glabrous, instead of white or pink and slightly glandular, perianth. In all the specimens of *E. brachyanthum* that I have examined, the stem for a distance of 3 to 10 mm. above the insertion of the leaves is densely and persistently lanate, but above abruptly glabrous. In *E. baileyi* the stem is at maturity glabrous to the very base. In the field the differences of the two plants in color, size, and habit, are conspicuous. The National Herbarium contains specimens collected in the Mohave Desert by Palmer (No. 479 of 1876), Parish Brothers (No. 1359 of 1882), and Tracy, in addition to Nos. 1013 and 1138 of the present collection, the latter from the vicinity of Mohave.

Eriogonum corymbosum Benth. in DC. Prodr. xiv. 17 (1856). Type locality, "in itinere Californico prope Grand-River." Collected by Fremont.

Eastern slope of the Sierra Nevada, near Lone Pine (No. 1688). Determined by W. M. Canby.

Eriogonum cæspitosum Nutt. Journ. Acad. Phil. vii. 50 (1834). Type locality, "on the sides of the Rocky Mountains, towards the sources of the Columbia."

Black Cañon, White Mountains (No. 1794).

Eriogonum fasciculatum Benth. Trans. Linn. Soc. xvii. 411 (1837). Type locality, "Upper California."

Near San Bernardino (No. 37). See *E. polifolium.*

Eriogonum incanum Torr. & Gr. Proc. Amer. Acad. viii. 161 (1870). Type locality, "on the Tuolumne River [Sierra Nevada, California], alt. 8–11,000 feet."

Mount Silliman (No. 2092). Referred doubtfully by Mr. Canby to *E. incanum.*

Eriogonum inflatum Torr. & Frem. in Frem. Second Rep. 317 (1845). Type locality, "on barren hills in the lower part of North California."

This species although described as an annual is oftener a barely suffrutescent perennial. The dead inflated peduncles, remaining throughout the winter and finally bleaching to a yellowish white color, have given rise to the popular name "cigarette plant."

It occurs in the *Larrea* belt throughout the desert, a common and characteristic plant. Specimens were collected in Furnace Creek Cañon, Funeral Mountains (No. 239), and near Hot Springs, in Panamint Valley (No. 680).

Eriogonum insigne Wats. Proc. Amer. Acad. xiv. 295 (1879). Type locality, "near Red Creek, S. Utah."

Furnace Creek Cañon (No. 235). Verified by W. M. Canby.

Eriogonum marifolium Torr. & Gr. Proc. Amer. Acad. viii. 161 (1870). Type localities, "Mount Shasta, 7–9,000 feet," and "high mountain near Donner's Pass, Sierra Nevada."

Near Mineral King, Sierra Nevada (No. 1539). Determined by W. M. Canby. [Approaching *E. incanum* in being densely cespitose and in the leaves being canescent-tomtentose on both sides. The flowers, involucres, etc., are more like those of *E. marifolium.*—W. M. C.]

Eriogonum nidularium.

Cottonwood Cañon, Panamint Mountains (No. 963). This is the plant which has been called, for more than twenty years,[1] *E. plumatella*, but which proves to be really far different from that species.[1] When a growing specimen becomes mature the ends of the branches curve inward, forming a dense mass somewhat resembling a bird's-nest, a peculiarity which, in the field, forms a good diagnostic character, and to which the new specific name refers.

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[1] Proc. Amer. Acad. viii. 179 (1870); Bot. King Surv. 306, 481 (1871); Bot. Cal. ii. 31 (1880).

Specimens were collected in Cottonwood Cañon, Panamint Mountains (No. 963).

Eriogonum nivale Canby sp. nov.

Plant perennial, cespitose, densely white-tomentose throughout above the ground; branches several from the caudex, short and stout, thickly covered with the remains of former leaves, the present ones tufted at the ends of the branches, from which spring the usually solitary, naked peduncles 2.5 to 8 cm. high; involucre solitary, turbinate, about 3 mm. long, with 6 to 8 rounded teeth; leaves very small, 4 to 6 mm. long, ovate, tapering into a short petiole; flowers large for the size of the plant, 3 to 4 mm. long; perianth bright rose-color when young, becoming paler with age, the divisions glabrous and of about equal length, each having a prominent much darker midvein, the outer ones rounded oval, the inner ones oblong or oblanceolate, all obtuse and glabrous.

Type specimen in the United States National Herbarium, No. 1657 of the Death Valley Expedition, collected August 20, 1891, at timber-line on a divide northwest of Whitney Meadows, Sierra Nevada, Tulare County, California, by Frederick V. Coville.

The species stands near *E. ovalifolium* and *E. kennedyi.*

Eriogonum nudum Benth. Trans. Linn. Soc. xvii. 413 (1837)—Dougl. MS. Type locality, "plains of the Multoonah."

In Tehachapi Cañon (No. 1131) and near Whitney Meadows (No. 1645). Determined by W. M. Canby. [The former of these two numbers presents an unusual branching of the umbel.—W. M. C.]

Eriogonum nudum pauciflorum Wats. Proc. Amer. Acad. xii. 264 (1877). Type locality not given.

Valley of the South Fork of Kern River (No. 1031). Determined by W. M. Canby. [This plant is as large as *E. grande* Greene, and intergrades with it.—W. M. C.]

Eriogonum ovalifolium Nutt. Journ. Acad. Phila. vii. 50 (1834). Type locality, "sources of the Missouri."

Wood Cañon, Grapevine Mountains (No. 1762). Determined by W. M. Canby.

Eriogonum parryi Gray, Proc. Amer. Acad. x. 77 (1874). Type locality, "Southern Utah."

Near Keeler (No. 869), and in the Grapevine Mountains, Nevada (No. 979). In one specimen the reniform leaves attain a breadth of 4.5 cm.

Eriogonum plumatella Dur. & Hilg. Pl. Heerm. 45 (1855). Type locality, "Posa Creek," Kern County, California.

By some singular mistake the name of this plant was very early transferred to a totally different annual species confined to the interior desert region. The true *E. plumatella*, the incomplete specimens of which were excellently figured,[2] is shown by an examination of the original plant of Durand and Hilgard, kindly loaned by Mr. J. H. Redfield of the Philadelphia Academy, to be the same as that afterward described and since known as *E. palmeri.* The two species have almost no resemblance except in their calyces. *E. plumatella* is a perennial with tall, zigzag stems, scattered, abruptly divaricate branches, and oblanceolate leaves at the forks; while the other, which has been named above *E. nidularium*, is an annual with a dense mass of ascending branches, and its leaves all radical and orbicular.

Specimens of *Eriogonum plumatella* were seen in Walker Pass.

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[1] See *Eriogonum plumatella.*

[2] Pac. R. Rep. v. pt. iii. pl. xvi (1855).

Eriogonum polifolium Benth. in DC. Prodr. xiv. 12 (1856). Type localities, "in Sierra Nevada Californiæ" and "ad San Diego."

On Browns Peak (No. 177), and in Cottonwood Cañon, Panamint Mountains (No. 966). In this journey from San Bernardino to the Mohave Desert, through Cajon Pass, the local geographical limits of this species and *E. fasciculatum* are clearly brought out. On the south or intramontane slope of the pass the latter is an abundant and characteristic plant below the chaparral belt, while on the desert side the lower, broader-leafed *E. polifolium*, with its elongated peduncles and congested inflorescence, is equally characteristic. It is abundant throughout the upper part of the Lower Sonoran zone in the region traversed.

Eriogonum pusillum Wats. Proc. Amer. Acad. viii. 184 (1870). Type locality, "foothills of Trinity Mountains, borders of the Truckee Desert, Nevada."

Near Willow Creek, Panamint Mountains (No. 770), and near Crystal Spring, Coso Mountains (No. 926).

Eriogonum reniforme Torr. & Frem. in Frem. Second Rep. 317 (1845). Type locality, "on the Sacramento river," California. This plant, which has been but sparingly collected, has been found in recent years only in the Mohave Desert region, and it is probable that Fremont collected the original specimens there. A similar error in the type locality appears to have been made in the case of *Cleomella obtusifolia.*

Verified by W. M. Canby. [No. 665 exactly agrees with the type specimen in the Torrey Herbarium. It is a closer set plant than No. 860 and branches from the very base. No. 860 I can not separate from *E. reniforme* although it appears different. It varies from the type in being of a more open habit—the pedicels longer and more delicate—in its branching just above the base instead of at the very base, in having pedicels in the very lowest axils, and in the whitish glaucous broad turbinate involucres acute at base instead of campanulate and obtuse as in No. 665.—W. M. C.]

Eriogonum saxatile Wats. Proc. Amer. Acad. xii. 267 (1877). Type localities, "on rocks above San Bernardino," and "in the Santa Lucia Mountains," both in California.

In Willow Creek Cañon, Panamint Mountains (No. 804), and in the valley of the Kaweah River (No. 1329). Determined by W. M. Canby.

Eriogonum thomasii Torr. Pac. R. Rep. v. pt. ii. 364 (1857). Type locality, "near Fort Yuma," Arizona.

Near Hot Springs, Panamint Valley (No. 670).

Eriogonum trichopes Torr. in Emory, Rep. 150 (1848). Type locality, "eastern slope of the Cordilleras of California."

Near Hot Springs, Panamint Valley (No. 686), and in the valley of the Virgin River (No 1919). The specific name of this plant has usually been written *trichopodum,* but it was published in the form given above.

Eriogonum umbellatum Torr. Ann. Lyc. N. Y ii. 241 (1828). Type locality, "near the Rocky Mountains."

In the high Sierra Nevada (Nos. 1451, 1656), and in the Inyo Mountains (No 1786). Determined by W. M. Canby. [No. 1656 is a peculiar, much depressed small-leafed state; the flowers, involucres, and bracts much the same as in Palmer's No. 426 of 1877, but the leaves more canescent and smaller.—W. M. C.]

Eriogonum virgatum Benth. in DC. Prodr. xiv. 16 (1856). Type locality, "in California."

Near Havilah (No. 1068) and in the valley of the Kaweah River (No. 1317). No. 1068 has deep red and No. 1317 yellowish white flowers.

Eriogonum wrightii subscaposum Wats. Bot. Cal. ii. 29 (1880). Type localities, "in the Sierra Nevada and W. Nevada."

At Soda Springs in the Sierra Nevada (No. 1603). Verified by W. M. Canby.

Oxytheca inermis Wats. Proc. Amer. Acad. xii. 273 (1877). Type locality, "California, probably on Mount Diablo."

Near Havilah (No. 1080).

Oxytheca perfoliata Torr. & Gr. Proc. Amer. Acad. viii. 191 (1870). Type locality, "Unionville, Humboldt, and Truckee valleys [Nevada], on the borders of the desert."

Between Victor and Stoddard Wells (No. 150).

Oxytheca spergulina (Gray) Proc. Amer. Acad. vii. 389 (1868), under *Eriogonum;* Greene, Fl. Fran. 153 (1891). Type locality, "dry sandy soil, banks of Big Creek, below the Mariposa Big-tree Grove," California.

Near Mineral King (No. 1453) and about Whitney Meadows (1622). The only technical character that distinguishes *Oxytheca* from *Eriogonum*, namely, the presence of terminal awns upon the lobes of the involucre,[1] if applied to this species and to *Oxytheca inermis*, necessitates their reference to *Eriogonum*, yet there can be no doubt that their true genetic affinity is with *Oxytheca*.[2]

Chorizanthe brevicornu Torr. Bot. Mex. Bound. 177 (1859). Type locality, "on the Gila River."

In Death Valley (Nos. 200, 477), and at many other points in the desert.

Chorizanthe perfoliata Gray, Proc. Bost. Soc. Nat. Hist. vii. 148 (1859). Type locality, "at Fort Tejon and vicinity, California."

In Tehachapi Cañon (No. 1136).

Chorizanthe rigida (Torr.) Pac. R. Rep. iv. 133 (1857), under *Acanthogonum;* Torr. & Gr. Proc. Amer. Acad. viii. 198 (1870). Type locality, "on Williams' river, a fork of the Colorado, Western New Mexico," now Arizona.

This is one of the commonest annuals of the desert, growing on gravelly mesas and washes in the dryest and hottest locations where any vegetation whatever can exist. It is a characteristic plant of the Lower Sonoran zone. Specimens were collected between Stoddard Wells and Daggett, California (No. 157), and in the valley of the Virgin River, Nevada (No. 1909).

Chorizanthe thurberi (Benth.) in DC. Prodr. xiv. 27 (1856), under *Centrostegia*—Gray MS.; Wats. Proc. Amer. Acad. xii. 269 (1877). Type locality, "in collibus arenosis ad San Felipe Californiæ."

On the Darwin Mesa (No. 798), in Cottonwood Cañon, Panamint Mountains (No. 964), and between Kernville and Havilah (No. 1045).

Chorizanthe uniaristata Torr. & Gr. Proc. Amer. Acad. viii. 195 (1870). Type locality, "New Idria, California, in very dry places."

In Walker Basin (No. 1090).

Chorizanthe watsoni Torr. & Gr. Proc. Amer. Acad. viii. 199 (1870). Type locality, "Nevada, on the borders of the desert, Humboldt, Reese-River, and Grass valleys."

Between Mohave and the mouth of Tehachapi Cañon (No. 1135).

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[1] Wats. Proc. Amer. Acad. xx. 371 (1885).

[2] See Greene, Fl. Fran. 152, 153 (1891).

Chorizanthe xanti Wats. Proc. Amer. Acad. xii. 272 (1877). Type localities, "near Fort Tejon," "San Bernardino," and "San Gorgonio," all in California.

In the southern Sierra Nevada (Nos. 1033, 1100). No. 1033 has a deep pink calyx and a more reddish color throughout, together with less leaf-like lower bracts than No. 1100.

Phyllogonum luteolum sp. nov.[1] PLATE XXI.

Plant annual, prostrate, of a yellowish green color throughout; lowest internode sometimes 6.5 cm. long; nodes subtended by a whorl of three leaves and giving rise to 3 or 5 branches; stem and branches terete, reaching 2 mm. in diameter, nearly glabrous below like the leaves, scantily provided above, like the pedicels and perianth, with divergent but flexuous hairs, in age probably glabrous; radical leaves and those of the lower nodes with a broadly oblong or obovate, obtuse, 3-nerved blade 10 to 15 mm. long, tapering abruptly into a petiole 15 to 30 mm. long; upper leaves becoming smaller, shorter-petioled, and at last sessile; inflorescence made up of fascicles of about 5 or 6 flowers inserted at the node, apparently in the axil of the upper leaf, without involucre and without bracts; upper fascicles becoming contiguous and congested into leafy-bracted glomerules terminating the branches; pedicel 5 mm. long or less, jointed at the base of the flower; perianth yellow, 1.5 to 2 mm. long; divisions 6, oblong-linear, obtuse, equal in the open flower, in the fruiting perianth the outer three only three-fourths as long as the inner; stamens 9; filaments filiform, two-thirds as long as the perianth; anthers orbicular 0.25 mm. long; styles 3, 0.5 mm. long, slightly enlarged at the apex, deciduous; achenium buff-colored, elliptical, triangular in transection, smooth and shining, 1.5 mm. long; embryo nearly straight; radicle lying along one angle of the seed; cotyledons orbicular, lying at the base of the seed, bent at an angle of about 45° from the radicle.

Ten polygonaceous genera are now referred to the tribe Eriogoneæ (including Kœnigieæ). Of these, five, *Eriogonum*, *Chorizanthe* (including *Centrostegia*), *Oxytheca*, *Hollisteria*, and *Lastarriæa* bear their flowers in di- to penta-phyllous involucres; four, *Nemacaulis*, *Harfordia*, *Pterostegia*, and *Kœnigia*, bear their flowers (the pistillate ones only in *Harfordia*) in the axils of monophyllous but sometimes involucriform bracts; while the new genus *Phyllogonum* has neither bract nor involucre. In structural characteristics it is most nearly related to *Nemacaulis*. Its vegetative character of three well-developed distinct leaves subtending each node distinguishes the plant from *Nemacaulis*, *Lastarriæa*, *Hollisteria*, and *Oxytheca*, the genera with which it is most likely to be confounded. In the peculiar yellowish color of the herbage, in the form of the lower leaves, and in habit, the species resembles *Oxytheca luteola*, which Dr. Parry at one time considered the type of a new genus, *Gymnogonum*; but the conspicuous 5-parted involucre of that plant is entirely wanting in *Phyllogonum*.

Type specimen in the United States National Herbarium, No. 584, Death Valley Expedition; collected April 7, 1891, in Furnace Creek Cañon, Funeral Mountains, Inyo County, California, by Frederick V. Coville. Only two specimens were collected, growing in the dry wash of the cañon about 2.5 kilometers above Furnace Creek Ranch.

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[1] **Phyllogonum** gen. nov.

Polygonacearum genus Eriogoneis affine. Nodi foliis tribus herbaceis petiolatis instructi. Flores lutei, pedicellati, ad nodos fasciculati, sine involucro sine bractea, facie in axilla folii, inserti, fasciculis superis brevitate internodorum adjacentibus, demum confluentibus.—Planta annua, prostrata, divergente ramosa, omnino luteola, ramis e nodo singulo tribus aut quinque, inæqualibus.

Nomen genericum e *φύλλον* et *γόνυ* derivatum est, nodi enim folia tria plene expansa, nec ut plerumque in generibus propinquis bracteis reducta, gerunt.

Pterostegia drymarioides Fisch. & Mey. Ind. Sem. Petrop. ii. 48 (1835). Type locality, "in portu Bodega Novae Californiae."

Observed in Johnson (No. 486), Surprise (No. 646), and Willow Creek cañons, Panamint Mountains, and in Caliente Valley, the latter locality in intramontane California. The plants grew always in the shade of rocks and therefore in somewhat moist soil.

Polygonum acre H. B. K. Nov. Gen. & Sp. ii. 179 (1817). Type locality, "locis abditis, udis prope Havanam et Caracas, (ad ripas Guayri, Calle de S. Juan et de S. Bartolomè), alt. 0–414 hex."

Near Visalia (No. 1265).

Polygonum amphibium L. Sp. Pl. i. 361 (1753). Type locality European.

Between Trout Meadows and Kern River (No. 1584).

Polygonum aviculare L. Sp. Pl. i. 362 (1753.) Type locality European.

This weed was seen at Keeler, at Havilah, at several points between the latter place and Tehachapi Cañon, and in cultivated soil near Tulare and Visalia. All these stations except the first are in intramontane California.

Polygonum bistortoides Pursh, Fl. i. 271 (1814). Type locality, "in low grounds on the banks of the Missouri, called *Quamash-flats.*" The type specimen was collected by Lewis and Clarke.

Near Mineral King (No. 1401).

Polygonum emersum (Mx.) Fl. i. 240 (1803), as *P. amphibium emersum*; Britton, Trans. N. Y. Acad. viii. 73 (1889). Type locality, "ad ripas fluminis Ohio."

Near Visalia (No. 1266). This is *Polygonum muhlenbergii* (Meisn.) Wats.

Polygonum hydropiperoides Mx. Fl. i. 239 (1803). Type locality, "in Pennsylvania, Virginia, Carolina."

Near Visalia (No. 1262).

Polygonum imbricatum Wats. Amer. Nat. vii. 665 (1873)—Nutt. in herb. Type locality not given; range, "frequent in the mountains, alpine and subalpine, from Colorado to Oregon and northern California."

Near Mineral King (No. 1508).

Oxyria digyna (L.) Sp. Pl. i. 337 (1753), under *Rumex;* Hill, Veg. Syst. x. 24 (1765). Type locality European.

This plant was found above timber-line, in the Sierra Nevada, near Mineral King, on the mountain slope south of the White Chief Mine.

Rumex crispus L. Sp. Pl. i. 335 (1753). Type locality European.

In Owens River Valley (No. 1769).

Rumex geyeri (Meisn.) in DC. Prodr. xiv. 64 (1856), as *R. engelmanni geyeri;* Trelease, Sp. Rum. 78 (1892). Type locality, "in Rocky Mountains."

In the high Sierra Nevada (Nos. 1683, 2094), and in the White Mountains (No. 1804).

Rumex hymenosepalus Torr. Bot. Mex. Bound. 177 (1859). Type locality, "sandy soils from El Paso to the cañons of the Rio Grande."

This valuable tannin plant, canaigre, occurred only at rare intervals in the region that we traversed. It was observed in the wash of Lytle Creek, near San Bernardino (No. 17); in the Vegas Valley near Cottonwood Springs, and along the road from Mohave to Searles's, between the summit and middle stations.

Rumex salicifolius Weinm. Flora, 1821, i. 28 (1821). Type locality, "in California."

In Willow Creek Cañon, Panamint Mountains (No. 823), and in Tehachapi Valley (No. 1117). The specimens of No. 823 are very large and robust.

ARISTOLOCHIACEÆ.

Asarum majus (Duchartre) in DC. Prodr. xv. pt. i. 424 (1864), as *A. hookeri majus;* Type locality, "in montibus Californiæ."

Valley of the Kaweah mountains (No. 1364). This is the same as *Asarum hartwegi* of Watson[1].

PIPERACEÆ.

Anemopsis californica (Nutt.) Ann. Nat. Hist. i. 136 (1838), under *Anemia;* Hook. & Arn. Bot. Beech. 390 (1841). Type locality, "springy bogs and open marshes by streams around Sta. Barbara and Sta. Diego in Upper California."

This plant, yerba mansa, is so common that a detailed statement of its localities need not be given. It occurs in moist alkaline soil throughout the region traversed, in the desert usually confined to the Lower Sonoran zone. It was found once, at Mountain Spring, Charleston Mountains, in the lower edge of the piñon belt. West of the Sierra Nevada the plant was equally abundant, and limited to about the same altitude. At Hot Springs (No. 682), in Panamint Valley, the Indians were seen one day digging the plant. They collected about half a bushel of it, roots, stems, and leaves, saying that they used it for medicine.

LAURACEÆ.

Umbellularia californica (Hook & Arn.) Bot. Beech. 159 (1833), under *Tetranthera;* Nutt. Sylv. i. 87 (1842–53). Type locality Californian, the specimens said to have been collected at either San Francisco or Monterey.

Valley of the Kaweah River (No. 1306).

LORANTHACEÆ.

Razoumofskya americana (Engelm.) in Gray, Pl. Lindh. ii. 214 (1850), under *Arceuthobium*—Nutt. MS.(?); Kuntze, Rev. Gen. Pl. ii. 587 (1891). Type locality, "Oregon, on Pinus."

At St. George, Utah (No. 1596). Descriptions of this plant and *Phoradendron flavescens villosum* may have been published earlier than the date cited in this report, but it has been impossible to find such publication.

Razoumofskya cryptopoda (Engelm.) in Gray, Pl. Lindh. ii. 214 (1850), under *Arceuthobium*. Type locality, "Santa Fé [New Mexico], only on *Pinus brachyptera.*"

Near Mineral King (No. 1460) and Soda Springs (No. 1597), in the Sierra Nevada, growing on *Pinus jeffreyi*. This plant was first mentioned by Engelmann[2] under the name *A. oxycedri*, without description, but with the manuscript synonym *A. robustum* Engelm. The latter name was subsequently adopted by Engelmann, but he did not take up for *A. divaricatum* the name *A. gracile*, which was published in the same place and manner as *A. robustum*.

Razoumofskya divaricata (Engelm.) Bot. Wheeler Surv. 253 (1878), under *Arceuthobium*. Type locality not given; range, "on Nut-pines (*P. edulis* and *monophyllos*) from Southern Colorado, through New Mexico, to Arizona."

In the Charleston Mountains (No. 308), on *Pinus monophylla*. See *R. cryptopoda*.

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[1] Proc. Amer. Acad. x., 463 (1875).

[2] Gray, Pl. Fend. 59 (1849).

Razoumofskya occidentalis (Engelm.) Bot. Cal. ii. 107 (1880), under *Arceuthobium;* Kuntze, Rev. Gen. Pl. ii. 587 (1891). Type locality not given; range, "on various conifers of the coast ranges and Sierra Nevada (*Pinus insignis, P. Sabiniana,* and *P. ponderosa*), from Salinas Valley and Walker's Basin to Oregon."

Near Havilah (No. 1073), on *Pinus sabiniana;* at Mineral King (No. 1482), on *Abies magnifica;* between Trout Meadows and Kern River (No. 1587), on *Abies concolor;* and near Lyon Meadow (No. 1739), on the same tree. This appears to be the plant that Engelmann[1] had previously described as *A. campylopodum,* but I have been unable to examine the type specimens of that species. No. 1587 has no male flowers, but it appears to belong here.

Phoradendron bolleanum (Seem.) Bot. Herald, 295 (1856), under *Viscum;* Eichler in Mart. Fl. Bras. v. pt. ii. 134m (1868). Type locality, "Sierra Madre," Mexico. Seeman's specimens were undoubtedly collected on a journey made by him from Mazatlan to Durango, and thence to Tepic.

On the south slope of Cajon Pass (No. 130), and in Tehachapi Cañon, this mistletoe was seen on *Juniperus californica*; in Johnson Cañon, Panamint Mountains (No. 589), on *Juniperus californica utahensis;* and in the mountains back of Fort Tejon (No. 1192), in Tejon Cañon, and in the valley of the East Fork of Kaweah River, between Big Tree Cañon and Mineral King, on *Abies concolor.* The plants that grow on the latter host have always laxer stems and larger leaves than those growing on the junipers.

Phoradendron californicum Nutt. Pl. Gamb. 185 (1848). Type locality, "in the mountains of Upper California. Parasitic on the trunks and branches of a *Strombocarpus.*"

This occurred at Resting Springs (No. 279), Ash Meadows, Vegas Valley, Vegas Wash, and Hot Springs, Panamint Valley, growing upon *Prosopis juliflora.*

Phoradendron flavescens macrophyllum Engelm. Bot. Wheeler Surv. 252 (1878). "They grow on soft woods (Ash, Willow, Poplar, Sycamore, and Sapindus) on the Gila and Bonita Rivers, and extend into Southern California."

This mistletoe was observed at many points in intramontane California, from San Bernadino to Visalia, on cottonwood and willow, but was not seen in the desert region.

Phoradendron flavescens villosum Engelm. in Gray, Pl. Lindh. ii. 212 (1850), as *P. villosum*—Nutt. MS. (?); Engelm. Bot. Wheeler Surv. 252 (1878). Type locality, "Wahlamet Woods, Oregon."

This was frequent on *Quercus douglasii* throughout its range, and in the valley of the Kaweah was seen also upon *Q. chrysolepis* and *Q. kelloggii.*

Phoradendron juniperinum Engelm. in Gray, Pl. Fendl. 58 (1849). "Parasitic on the two kinds of Shrub Cedar (Juniperus) which grow on the hills and elevated plains about Santa Fé," New Mexico.

Found only in the Charleston Mountains, both on the road to Clark's sawmill (No. 307) and north of Olcott Peak.

Phoradendron juniperinum libocedri Engelm. Bot. Cal. ii. 105 (1880). Type locality, "on *Libocedrus decurrens,* from the Yuba River to San Bernardino," California.

Found in the forests of the Sierra Nevada, along the East Fork of Kaweah River, and on the North Fork of Kern River (No. 1729), growing on *Libocedrus decurrens.*

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[1] Gray, Pl. Lindh. ii. 214 (1850).

SANTALACEÆ.

Comandra pallida A. DC. Prodr. xiv. 636 (1857). Type locality, "prope Clear Water, Oregon."

Near Mineral King, Sierra Nevada (No. 1467), and in the Beaverdam Mountains, Utah (No. 1945). The type locality of *C. umbellata* is "in Virginiæ, Pennsylvaniæ pascuis siccis."

EUPHORBIACEÆ.

Euphorbia albomarginata Torr. & Gr. Pac. R. Rep. ii. pt. iv. 174 (1855). Type locality, "head-waters of the Colorada."

In Johnson (No. 557) and Willow Creek (No. 769) cañons, Panamint Mountains, and in Shepherd Cañon, Argus Mountains (No. 735).

Euphorbia ocellata Dur. & Hilg. Pl. Heerm. 46 (1855). Type locality, "Posa Creek," Kern County, California.

Near Havilah (No. 1081).

Euphorbia polycarpa Benth. Bot. Sulph. 50 (1844). Type locality, "Bay of Magdalena," Lower California.

Near Bennett Wells (No. 198), and in Furnace Creek Cañon (Nos. 211, 585). Our specimens belong to the form with exappendiculate involucral glands, which has sometimes passed under the name *E. micromera* of Boissier.

Euphorbia schizoloba Engelm. Proc. Amer. Acad. v. 173 (1861). Type locality, "east of the Lower Colorado, lat. 35°, alt. 2,000 feet."

Surprise Cañon, Panamint Mountains (No. 629). This species was published by the same author in the same year under the name *E. incisa*[1], but the statement has been made by Gray and Trelease[2] that, "by an oversight this name was substituted for *E. incisa*, employed in Ives's Report, part 4, p. 27, and has priority of publication."

Euphorbia serpillifolia Pers. Syn. Pl. ii. 14 (1807). Type locality, "in Amer[ica] calidiore."

Near San Bernardino (No. 33).

Euphorbia setiloba Engelm. in Torr. Pac. R. Rep. v. pt. ii. 364 (1857). Type locality, "near Fort Yuma," Arizona.

In the Funeral Mountains, at a point west of Amargosa (No. 333).

Croton californicus Müll. Arg. in DC. Prodr. xv. pt. ii. 691 (1866). Type locality, "in California prope San Francisco et in arenosis pascuisque prope Monterey."

This plant is one of the common and characteristic species of the San Bernardino Valley (Nos. 32, 39), often occurring as a weed in neglected fields. It was not seen in the ultramontane region, but was met with again in intramontane California when we entered the Tulare Plains from the Cañada de las Uvas.

Croton setigerus Hook. Fl. Bor. Amer. ii. 141 (1838). Type locality, "on Menzies' Island, and on sandy banks of the Columbia upwards." .

Commonly known under the name *Eremocarpus setigerus*. I follow Professor Greene[3] in calling this plant a *Croton;* not as expressing an opinion that it does not constitute a distinct genus, but in order to avoid making a new generic name, since *Eremocarpus* was first used by Reichenbach, in 1837, as a designation for a genus of Hypericaceæ.

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[1] Bot. Ives Exped. 27 (1861).

[2] Botanical Works of George Engelmann, 440 (1887).

[3] Fl. Fran. 89 (1891).

Stillingia paucidentata Wats. Proc. Amer. Acad. xiv. 298 (1879.) Type locality, "Colorado Valley, near mouth of Williams River," Arizôna.
Near Little Owens Lake (No. 1007).

URTICACEÆ.

Celtis occidentalis reticulata (Torr.) Ann. Lyc. N. Y. ii. 247 (1828), as *C. reticulata;* Sarg. For. N. A. 126 (1884). Type locality, "base of the Rocky Mountains"
A specimen of *Celtis* was recorded in the valley of Caliente Creek, a few miles above Caliente. It probably belongs to the variety *reticulata* of *C. occidentalis*, but unfortunately no specimens were collected.

Urtica breweri Wats. Proc. Amer. Acad. x. 348 (1875). Type locality, "Los Angeles, California."
Near Whitney Meadows (No. 1696).

Urtica holosericea Nutt. Pl. Gamb. 183 (1848). Type locality, "near Monterey, Upper California."
This nettle was found at several points in the intramontane region between Walker Pass, Kernville, Caliente, and Tehachapi.

Urtica urens L. Sp. Pl. ii. 984 (1753). Type locality European.
Near Keene (No. 1109).

Parietaria debilis Forst. Fl. Ins. Aust. Prodr. 73 (1786). Type locality, "Nova Zeelandia."
In the Funeral Mountains, at a point west of Amargosa (No. 331).

PLATANACEÆ.

Platanus racemosa Nutt. Sylv. i. 47 (1842–53). Type locality, "Upper California, in the vicinity of Sta. Barbara."
This tree, the sycamore, was found only in intramontane California and showed no tendency to follow down the desert streams. It was observed on Lytle Creek (No. 128); along the branches of Caliente Creek; toward the lower end of the Cañada de las Uvas; in the lower part of Tejon Cañon; along Poso Creek; and along the lower Kaweah. Although a paludose plant it seemed to confine itself to the foothill belt, and not to extend into the chaparral.

CUPULIFERÆ.

Betula occidentalis Hook. Fl. Bor. Amer. ii. 155 (1838). Type localities, "Straits of De Fuca," and "near springs on the west side of the Rocky Mountains," and "on the east side, from the mountains to Edmonton House."
Near Lone Pine, at the point where the Hockett Trail crosses a small stream, at the eastern foot of the Sierra Nevada.

Alnus rhombifolia Nutt. Sylv. i. 33 (1842–53). Type locality, "in the vicinity of Monterey, in Upper California."
This tree, the alder, was seen only along streams in the Sierra Nevada, namely, at our camp near Kernville, at a few points along our route to Caliente, along the Kaweah River from Visalia to Big Tree Cañon, and on Kern River between Trout Meadow and Soda Springs.

Corylus rostrata californica DC. Prodr. xvi. pt. ii. 133 (1844). Type locality "in California."
The hazel-nut was seen only between Big Tree Cañon and Mineral King, on the headwaters of the Kaweah River.

Quercus breweri Engelm. Bot. Cal. ii. 96 (1880). Type locality, "on the middle or higher elevations of the Sierra Nevada, from Calaveras County to the Oregon line."

Quercus œrstediana,[1] to which *Q. breweri* has recently been referred,[2] cannot be, if it was accurately described by Brown, the same oak as this species. Its leaves are said to have "acutely cut lobes on either side," and a petiole "1¼ inch long," characters which cannot apply to *Q. breweri*. The former name should therefore be retained until the type specimens of *Q. œrstediana* can be examined. Specimens from the Siskiyou Mountains, named by Professor Greene *Q. œrstediana*, have longer petioles than our plant, and acutely lobed leaves. They are, with little doubt, true *Q. œrstediana*. These specimens differ from ours in the details mentioned above, and furthermore, in their very large buds. The buds of the two plants have about the same relative size as those of *Q. garryana* and *Q. lobata*. Plate x of Greene's West American Oaks, undoubtedly represents true *Q. breweri*.

The species was observed only in the valley of the Kaweah River (No. 1314), forming an important part of the chaparral immediately below the yellow pines.

Quercus californica (Torr.) Pac. R. Rep. iv. 138 (1857), as *Q. tinctoria californica;* Cooper, Rep. Smithson. Inst., 1858, 261 (1859). Type locality, "hillsides, Napa Valley," California.

Newberry's name *Q. kelloggii*[3] is antedated by Torrey's variety *californica* by only a short time. The title page of the fourth volume of the Pacific Railroad Report bears the date 1856, but the preface of Torrey's report, contained therein, is dated January 12, 1857. It appears, therefore, that a part at least of this volume did not appear until 1857. The sixth volume bears the same date, 1857, but came out later in that year than the fourth, for Newberry quoted in it Torrey's name for the tree, with the volume and page on which it was published.

The tree was found on Frazier Mountain (No. 1200); along the East Fork of the Kaweah, from Big Tree Cañon to a point about 6 kilometers below Mineral King; in Kings River Cañon (No. 2105); and on the eastern slope of the Sierra Nevada, about 6 kilometers west of Independence (No. 2107). At no point did it occur in great abundance, but scattered among the yellow or black pines.

Quercus chrysolepis Liebm. Dansk. Vidensk. Forhandl. 1854, 173 (1854). Type locality, "California."

The sheet of Bentham's Plantæ Hartwegianæ, on which this species is described, on page 336, bears the date upon its signature "Feb., 1857," not 1849, as usually quoted, the latter date belonging to preceding sheets of that work. Liebmann's name therefore antedates Kellogg's *Q. fulvescens* by but a single year. Type locality, as taken from Plantæ Hartwegianæ, page 337, "in montibus Carmel prope Monterey."

This tree was found in abundance back of Fort Tejon (No. 1156), and along the East Fork of the Kaweah. It occurred also on the south slope of Cajon Pass and in Kings River Cañon (No. 2104). The tree is characteristic of the chaparral belt, in the higher parts of it being reduced often to a shrub only 2 or 3 meters high. In shaded ravines, as in the Cañada de las Uvas, individual trees sometimes descend far below the proper belt of the species.

Quercus douglasii Hook. & Arn. Bot. Beech. 391 (1841). Type locality, Californian, but not accurately recorded. The type specimens were collected by Douglas.

On the road between Kernville and Caliente (No. 1044), and in the foothills of the Liebre Mountains (No. 1141). This oak is the characteristic tree of the Sierran foothills along the whole eastern limit of the Tulare Plains. It extends as far up the

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[1] R. Br. Campst. Ann. & Mag. Nat. Hist. ser. 4. vii. 250 (1871).

[2] Wats. Proc. Amer. Acad. xxii. 477 (1887).

[3] Pac. R. Rep. vi. pt. iii. 28 (1857).

Kaweah River as Kane Flat; in the Cañada de las Uvas to within a half-mile of old Fort Tejon; and in the valley of Kern River as far as the foothills, a few miles south of Kernville, on the Caliente road. The upper limit of its range is the lower limit of the chaparral belt.

Quercus dumosa Nutt. Sylv. i. 7 (1842-53). Type locality, "over the base of the hills which flank the village of Sta. Barbara, in Upper California."

This scrub oak occurred in abundance on the south slope of Cajon Pass (Nos. 115, 116), extending a short distance over its summit. A few specimens were seen on the foothills south of Antelope Valley, on Liebre Ranch (No. 1140). No. 115 is Engelmann's variety *bullata*.

Quercus gambelii Nutt. Pl. Gamb. 179 (1848). Type locality, "on the banks of the Rio del Norte."

Specimens were collected on the southern escarpment of the Elden Mesa, near Flagstaff, Arizona (No. 5). Within the range of the survey the plant did not occur west of the Charleston Mountains, Nevada, where it was found in the nut pine belt, both on the road to Clark's sawmill and near Mountain Springs. Dr. Merriam found it along his route from the upper crossing of the Santa Clara Valley to a point beyond Mountain Meadows, Utah, and in the Juniper Mountains, Nevada.

Quercus lobata Nee, Anal. Cienc. Nat. iii. 278 (1801).

This tree, the common white oak of southern California, requires a deep, rich soil, well watered from beneath. The great area of the southern Tulare Plains is too dry to support the tree, except in restricted localities. Along the bottoms of those streams which are wide enough to furnish the requisite depth of soil the tree ascends to an altitude of more than 1,000 meters. It was found from Caliente (No. 1111) to Tehachapi Valley; near Liebre Ranch house (No. 1139); in the Cañada de las Uvas, extending past Fort Tejon and as far above as Castac Lake; about Tejon Ranch house; at several points northward in the Tulare Plains; and along the Kaweah River to a point a few kilometers above Three Rivers. In the well-watered region of Tulare and Visalia this oak grows abundantly. The tree is a magnificent species. Trunks 1.2 to 1.8 meters in diameter are common; and one on the old parade ground at Fort Tejon measured 8.03 meters in circumference. In the year 1876 Dr. Rothrock, botanist of the Wheeler Survey, measured the same tree and found it to be 8 feet 2 inches in diameter. Reduced to the same units, these measurements give a diameter in 1876 of 2.49 meters, and in 1891, 2.55 meters. One of the three main limbs described by Rothrock had been broken off several years before our visit.

Quercus undulata Torr. Ann. Lyc. N. Y. ii. 248 (1828). Type locality, "sources of the Canadian, and the Rocky Mountains."

This I take to be the true *Q. undulata*. The tree was not found west of the Charleston Mountains, where it occurred on the east slope of Mountain Springs Pass (No. 385). It is a species characteristic of the Rocky Mountain region. Dr. Merriam has reported it also from the Juniper Mountains of Nevada, and the upper Santa Clara Valley and Beaverdam Mountains of Utah.

Quercus wislizeni DC. Prodr. xvi. pt. ii. 67 (1864). Type locality originally given incorrectly as Chihuahuan, but subsequently corrected[1] to "the American Fork of the Sacramento River," California.

This oak is characteristic of the foothill belt of the western slope of the Sierra Nevada. It has a slightly higher range than *Q. douglasii*, but does not extend really into the chaparral belt. It was found at several points from Fort Tejon to the valley of the Kaweah, specimens being collected in the valley of the South Fork of Kern River (No. 1028), between Kernville and Havilah (No. 1103), and on the hillsides near Fort Tejon (No. 1152).

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[1] Trans. St. Louis Acad. iii. 396 (1877).

Castanopsis chrysophylla (Hook.) Fl. Bor. Amer. ii. 159 (1838), under *Castanea*—Dougl. MS.; DC. in Seem. Journ. Bot. i. 182 (1863). Type locality, "on the Grand Rapids of the Columbia, to Cape Orford, and near Mount Hood."

In the black pine belt of the Sierra Nevada, both in the valley of the Kaweah River (No. 1380) and in the valley of the North Fork of Kern River.

SALICACEÆ.

SALIX by M. S. BEBB.

Salix barclayi Anders. Sal. Bor. Amer. 66 [20] (1858). Type locality, "in America boreali-occidentali: Kodiak."

The distribution of this species is from the Sierra Nevada (No. 1572) and the mountains west of the Great Basin northward along the Cascade and Coast ranges to Alaska. Dr. Andersson's descriptions, necessarily drawn from inadequate material, are all more or less inaccurate and misleading, but there can be no question as to the identity of the type specimen in the Kew Herbarium. Taken throughout its entire range the species, as a whole, exhibits a degree of variation remarkable even among willows, vacillating, as it were, between *S. cordata* and *S. glauca*, and might, perhaps more reasonably, be regarded as a group of several ill-defined species, in which category should be placed *S. californica* Bebb, of the Botany of California, and *S. commutata* Bebb, of Notes on North American Willows in Bot. Gaz. xiii. 110 (1888). *S. conjuncta*, of the same paper, does not differ from the Alaskan type.

Salix flavescens Nutt. Sylv. i. 65 (1842–53). Type locality, "in the range of the Rocky Mountains."

Collected near Mineral King in the Sierra Nevada (No. 1444). The species ranges from California and New Mexico northward to British Columbia and along the coast to Alaska.

Salix glauca villosa (Hook.) Fl. Bor. Amer. ii. 144 (1838), as *S. villosa;* Anders. Sal. Bor. Amer. 68 [22] (1858). Type locality, "Rocky Mountains * * * to the Arctic Sea-coast."

Between Mineral King and Farewell Gap, Sierra Nevada (No. 1564). It occurs most abundantly about the headwaters of the Saskatchewan River, but is widely distributed in British America, in the Rocky Mountains, and eastward north of latitude 50°. Southward within the United States it has not been found west of the Great Basin, except on Mount Hoffmann and Woods Peak by Professor Brewer, and on Mount Whitney by Professor Rothrock. To these localities the present collection, after the lapse of more than ten years, adds a third in the same region. The identity of the earlier collections of Brewer and Rothrock with the plant of the Rocky Mountains was somewhat doubtful. The leaves were very narrow, attenuate-pointed, and somewhat falcate, scarcely paler beneath, and covered alike on both sides with a minute pubescence; and these peculiarities seemed to gain increased significance from the fact that in a still more marked degree they characterized Dr. Watson's No. 1099 (Bot. King Exped. 325) from the East Humboldt Mountains, collected at an altitude of 2,750 meters. But in the specimens of the present collection, precisely similar as they are to those collected on the mountains of Colorado, we have indubitable evidence that *S. glauca villosa*, after keeping exclusively east of the Great Basin to the extreme southern limit of its range, does, nevertheless, find a rare lodgment in a few of the highest peaks of the Sierra Nevada.

Salix lævigata Bebb, Amer. Nat. viii. 202 (1874). Type localities, "Santa Cruz," "Ukiah," "Alameda County," points all in California.

This species was collected at Lone Willow Spring (Nos. 169, 1872), and near

Brewery Spring, in the Panamint Mountains (No. 598). It ranges throughout California, and is known to occur in Oregon. It has been found in Guatemala at 1,300 meters altitude (No. 333 of John Donnell Smith's distribution), and presumably occurs at intermediate stations.

Salix lasiolepis Benth. Pl. Hartw. 335 (1857). Type locality, "ad ripas fluviorum Salinas et Carmel prope Monterey," California.

Collected on the south slope of Cajon Pass, San Bernardino Mountains (No. 129), Johnson Cañon, and Surprise Cañon, Panamint Mountains (Nos. 493, 597, 625), and near Visalia (No. 1268). The species is very common through the whole State of California—which may be regarded as the center of its area of distribution—northward, mainly as variety *bigelovii*, as far as Seattle, Washington; southward in Mexico and on the peninsula of Lower California (Brandegee) to within the tropics at an altitude of 1,500 meters. It varies exceedingly in the form of the leaves, the more or less densely flowered aments, and even from forms with densely clothed scales (which suggested the name), to those like the present, with scales only thinly hairy.

Salix longifolia Muhl. Neue Schrift. Gesell. Naturf. Freunde Berlin, iv. 238 (1803). Type locality, "ad Susquehannam," i. e., near the Susquehanna River, in Pennsylvania.

Collected in Furnace Creek Cañon, Funeral Mountains (No. 215); in Pahrump Valley, Nevada (No. 294); at Furnace Creek Ranch (No. 468); at Hot Springs, Panamint Valley (No. 681); and in Surprise (No. 722) and Willow Creek (No. 788) cañons, Panamint Mountains.

This species in various forms occurs in Mexico, Texas, Louisiana, and northward throughout the Mississippi basin and the region of the Great Lakes to latitude 60° N. in the valley of the Mackenzie River. It is common and reaches its fullest development in the Pacific coast States, while east of the Allegany Mountains it occurs rarely from the valley of the Potomac River to New Brunswick. The *longifoliæ*, whether considered in the aggregate as an exceedingly polymorphous species or as "a congeries of species in the making," including *S. taxifolia*, *S. sessilifolia*, etc., present a strongly marked group of willows peculiar to America. Not connected with Old World forms by any synthetic type of the present or, so far as known, of any preceding period of time, its abundance and diversity, both in form and stature, on the Pacific slope, and gradual decrease, both in vigor and variability, throughout its range northeastward, are facts which sustain the conjecture that the group was derived from the Mexican plateau at the close of the Tertiary period.

Salix longifolia argyrophylla (Nutt.) Sylv. i. 71 (1842–53), as *S. argyrophylla;* Anders. Kongl. Sven. Akad. Handl. [ser. 4] vi. 55 (1865). Type locality, on "one of the branches of the Oregon, the river Boisée, towards its junction with the Shoshonee."

Collected near Visalia (No. 1267).

Salix longifolia exigua (Nutt.) Sylv. i. 75 (1842–53), as *S. exigua;* Bebb, Bot. Cal. ii. 85 (1880). Type locality, "the territory of Oregon," growing with Nuttall's *Salix fluviatilis*, which was first collected on "the immediate border of the Oregon [River], a little below its confluence with the Wahlamet."

At Resting Springs (No. 263).

Salix macrocarpa argentea Bebb, Bot. Gaz. x. 223 (1885). Type localities, "Sierra County," and "Plumas County," California.

This is the *Salix geyeriana* of the Botany of California, not of Andersson. The typical *S. macrocarpa* is a species of the Columbia River Valley and Puget Sound region, while the variety *argentea* is known only from the Sierra Nevada of California. It was collected by the expedition in a natural meadow in the Sierra Nevada, near Mineral King (No. 1427).

Salix nigra venulosa (Anders.) Monogr. Sal. 22 (1867), as a form, *venulosa*, of *Salix nigra longipes;* Bebb, Bot. Gaz. xvi. 102 (1891). Type locality, "in Nova Mexic

The prevailing form of *S. nigra* throughout western Texas, New Mexico, Arizona, and southern California. The varietal name may be regarded as tentative. Should variety *wrightii* of Andersson prove to have been founded upon an abnormal growth of this variety, the name *wrightii* should be taken instead. Specimens were collected at Resting Springs (No. 262); at Winters's ranch, Pahrump Valley, Nevada (No. 295); at Ash Meadows, Nevada (No. 2145); at Furnace Creek Ranch (No. 469); in Mill Creek Cañon, Panamint Mountains (No. 805); and on the Tulare Plains, about 16 kilometers south of Bakersfield (No. 1236). [At all these points the tree occurred in the Lower Sonoran zone, growing in the moist soil about springs or streams, or on irrigated land. It was often planted in such places as a shade tree.—F. V. C.]

Populus fremontii Wats. Proc. Amer. Acad. x. 350 (1875). Type locality, "on Deer Creek at 'Lassens' in the Upper Sacramento Valley."

The name *Populus fremontii* is here used for the cottonwood of the desert region, which has sometimes been designated *P. fremontii wislizeni*. While a difference may exist between this plant and the tree of central California, neither the specimens in the National Herbarium nor the published descriptions give any real idea of the nature of that difference. The tree was cultivated at Furnace Creek Ranch (No. 470), and occurred also along the Mohave River at Victor; at Cottonwood Spring, Vegas Valley; along Cottonwood Creek, on the west side of Owens Lake (No. 973); and in Cottonwood Cañon, Panamint Mountains. The tree is often cultivated for shade at the desert ranches, but it cannot exist without an abundant supply of water.

Populus monilifera Ait. Hort. Kew. iii. 406 (1789). Type locality, "Canada."

Specimens were collected from trees growing in a wild state along Cottonwood Creek, on the west side of Owens Lake (No. 996), and in the lower part of the Cañada de las Uvas (No. 1163). The tree was found also in the cañon east of Tejon Ranch.

Professor C. S. Sargent, to whom specimens were sent, says: "Dr. Parry sent me some years ago specimens, from trees cultivated in San Bernardino, of what is evidently the same thing. He thought it might be a new species, as it was said to have been brought from mountains in the neighborhood. I thought, however, that it had been carried to California from the East and that it was the common cottonwood. * * * I should now be inclined to believe that the western range of *Populus monilifera* ought to be extended to take in southeastern California."

So far as is known at present the range of this species in California is confined to the southern Sierra Nevada and the San Bernardino Mountains, at altitudes below the yellow and black pine timber.

Populus tremuloides Mx. Fl. ii. 243 (1803). Type locality, "in Canada et Noveboraco."

Near Mineral King (No. 1470).

Populus trichocarpa Torr. & Gr. in Hook. Ic. Pl. ix. 878 (1850?).

This tree was found at several points in the Sierra Nevada, namely, in Tejon Cañon (No. 1215), at Mineral King, in Kings River Cañon (No. 2106), and along the Hockett Trail on the eastern slope of the mountains.

CERATOPHYLLACEÆ.

Ceratophyllum demersum L. Sp. Pl. ii. 992 (1753). Type locality European.

Near San Bernardino (No. 25) and near Bakersfield (No. 1242).

ORCHIDACEÆ.

Corallorhiza multiflora Nutt. Journ. Acad. Phil. iii. 138 (1823). Type locality, "From New England to Carolina."

Near Mineral King (Nos. 1382, 1422).

Gyrostachys romanzoffiana (Cham.) Linnæa, iii. 32 (1828), under *Spiranthes;* MacMillan, Metasp. Minn. Val. 171 (1892). Type locality, "in alveo turfoso convallium infimorum Unalaschcæ passim."

In and near Whitney Meadows (Nos. 1633, 1713).

Epipactis gigantea Hook. Fl. Bor. Amer. ii. 202 (1839)—Dougl. MS. Type localities, "on the subalpine regions of the Blue and Rocky mountains," and "Columbia River, about Fort Vancouver."

Collected in Furnace Creek Cañon, Funeral Mountains (Nos. 224, 581), and in Mill Creek (No. 809), and Cottonwood (No. 970) cañons, Panamint Mountains.

Habenaria elegans (Lindl.) Gen. & Sp. Orchid. 285 (1835), under *Platanthera;* Boland. Cat. 29 (1870). Type locality, "in America boreali occidentali."

In the valley of the Kaweah River (No. 1333).

Habenaria leucostachys (Lindl.) Gen. & Sp. Orchid. 288 (1835), under *Platanthera;* Wats. Bot. Cal. ii. 134 (1880). Type locality, "in ora occidentali Americæ septentrionalis."

In the valley of Kaweah River (No. 1335), near Mammoth (No. 1822), and in Sequoia Park (No. 2096).

IRIDACEÆ.

Iris missouriensis Nutt. Journ. Acad. Phila. vii. 58 (1834). Type locality, "towards the sources of the Missouri."

Black Cañon, White Mountains (No. 1795).

Sisyrinchium bellum Wats. Proc. Amer. Acad. xii. 277 (1877). Type locality not given; range, "throughout California and to the Columbia River."

In Furnace Creek Cañon (No. 225); in a marsh about one-half mile south of the Devil Hole, Ash Meadows; and at Mountain Spring, Charleston Mountains.

AMARYLLIDACEÆ.

Agave utahensis Engelm. Bot. King Surv. 497 (1871). Type locality, "about St. George, Utah."

The first specimen of this interesting species of mescal was brought in by Mr. F. Stephens from the mountains east of Resting Springs Valley, at a point several kilometers north of Resting Springs. This locality lies within the State of California. The plant was afterwards seen in great abundance near Mountain Springs, in the Charleston Mountains, Nevada (No. 378), growing in the lower portion of the piñon belt. One tuft was seen here with 42 well-developed heads, besides many smaller ones, growing from a single root. Dr. Merriam found it also on the west slope of the Beaverdam Mountains in Utah.

LILIACEÆ.

Smilacina stellata (L.) Sp. Pl. i. 316 (1753), under *Convallaria;* Desf. Ann. Mus. Par. ix. 52 (1807). Type locality, "in Canada."

Near Willow Creek, Panamint Mountains (No. 960).

Smilacina amplexicaulis Nutt. Journ. Acad. Phila. vii. 58 (1834). Type locality, "in the valleys of the Rocky Mountains, about the sources of the Columbia river."

Near Mineral King, Sierra Nevada (No. 1440).

Yucca arborescens (Torr.) Pac. R. Rep. iv. 147 (1857), as *Y. draconis arborescens;* Trelease, Third Rep. Mo. Bot. Gard. 163 (1892). Type locality, "sandy and gravelly plains west of the Colorado, California." This species was subsequently described[1] as *Y. brevifolia*, a name under which it has passed until recently.

The distribution of this remarkable plant, the tree yucca, in the desert region traversed by the expedition has been made the subject of detailed observations by Dr. Merriam,[1] so that little need be said about it here. As a zonal plant it is characteristic of the upper altitudes of the Lower Sonoran zone, where it is sometimes so abundant that large areas of it have been fitly called yucca forests. The name 'Joshua tree,' by which it is rather jocularly known, is said to have originated among the Mormons. The largest trunk measured was a stump found between Cajon Pass and Hesperia, whose diameter was 58 cm.; the tallest specimen, on the western slope of the Charleston Mountains, was 7.9 meters high.

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[1] Engelm. in Wats. Bot. King Surv. 496 (1871).

The plate of *Yucca arborescens*, used as the frontispiece of this report, was reproduced from a photograph taken by the writer in the Mohave Desert, a few kilometers north of Victor.

Yucca baccata Torr. Bot. Mex. Bound. 221 (1859). Type locality, "High table lands between the Rio Grande and the Gila," New Mexico.

In the original description of *Y. baccata* the following statements occur: "According to Dr. Bigelow it is a low species with a subterranean caudex," and "The flowers * * * are larger than in any other species of Yucca here noticed; the sepals being 2¼ to 3 inches long, tapering to each end, and 6 to 7 lines wide in the middle." From these quotations it is clear that the type form of *Y. baccata* is not the plant with a stout, arborescent trunk, and flowers 3 to 4 cm. long, which ranges from western Texas to southeastern California, and which goes under the simple name of *Y. baccata*. In the Charleston Mountains of Nevada the writer had excellent opportunity to make a comparison in the field between this arborescent plant and a related but trunkless one, both of which are abundant in that locality. There is no doubt that in this region the two are quite distinct, differing not only in their stems and flowers but in the color of their leaves, those of the arborescent species being yellowish green; of the trunkless species, glaucous. The latter answers the description of true *Y. baccata* and is so referred, while the arborescent species receives another name as printed below. (See *Yucca macrocarpa*.)

Yucca baccata is a characteristic plant of the Upper Sonoran zone. It was observed by the writer only in the Charleston Mountains, Nevada (Nos. 310, 377), but farther eastward and northward Dr. Merriam and Mr. Bailey found it in several localities, as follows: Indian Spring Valley, Timpahute and Desert mountains, Pahranagat Valley, Hyko Mountains, Pahroc Mountains, Desert Mountains (No. 1990), Highland Range, and Juniper Mountains, in Nevada, and the upper Santa Clara Valley and Beaverdam Mountains, in Utah.

Yucca glauca Nutt. in Fraser, Cat. (1813). Type locality, "1,600 miles up the Missourie, about lat. 49°."

Near Panaca, Nevada (No. 1983). The plant from Arizona and Utah, which has been referred to this species, is probably different in some respects from the typical form of the Great Plains region. This is the *Yucca angustifolia* of Pursh.

Yucca macrocarpa (Torr.) Bot. Mex. Bound. 222 (1859), as *Y. baccata macrocarpa*, not *Y. macrocarpa* Engelm.[2]

The smaller arborescent *Yucca* of the Mohave Desert region, which has passed under the name *Y. baccata*, is easily distinguishable from the true *Y. baccata* by the characters mentioned above under that species. The writer has not had an opportunity to investigate the identity of this Mohave Desert *Yucca* and the arborescent bacciferous *Yucca* of western Texas (which also has been called *Y. baccata*, but which is likewise different from that species), but they are supposed to be the same.

Dr. Torrey wrote:[3] "On the plains of western Texas, near the Limpio, and in the vicinity of Presidio del Norte, Dr. Bigelow found a yucca 10–15 feet high, with eaves almost exactly like those of *Y. baccata*, but the fruit is longer, though not greater in diameter, and the pulp is thicker. It may, till better known, be regarded as a variety (*macrocarpa*) of that species." Specimens were collected near Hesperia (No. 139). The distribution of the species in the Death Valley region is given in full by Dr. Merriam.[1]

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[1] North American Fauna, No. 7, pp. 353–358 (1893).

[2] Bot. Gaz. vi. 224 (1881).

[3] Bot. Mex. Bound 221 (1859).

Yucca radiosa (Engelm.) Bot. King Surv. 496 (1871), as *Y. angustifolia radiosa;* Trelease, Third Rep. Mo. Bot. Gard. 163 (1892). Type locality, "in Central Arizona and northward to the borders of Utah."

At St. George, Utah (No. 1954). This is the plant described afterward[2] as *Y. angustifolia elata*, and later still[3] as *Y. elata*. Dr. Edward Palmer collected it in southern Utah, near St. George, more than twenty years ago, probably at the same place from which our specimens came. Dr. Engelmann says of Palmer's specimens, "about St. George, Utah, a form occurs with leaves only 2‴ [4 mm.] wide." In our plant the perianth is 2.5 to 3 cm. long, smaller than is usual in the species.

Yucca whipplei Torr. Bot. Mex. Bound. 222 (1859). Type locality, "on rocks near San Pasqual, southern California."

This *Yucca* is characteristic of the coastward slope of the San Bernardino Mountains and southern Sierra Nevada. It was found in the wash of the Santa Ana, near San Bernardino; in Soledad Pass; along the South Fork of Kern River (No. 1035); at many points between Kernville and Tehachapi Valley; in Tehachapi Cañon; and near Liebre Ranch house, Antelope Valley.

Chlorogalum pomeridianum (Ker) Journ. Sci. i. 181 (1816), under *Anthericum;* Kunth, Enum. Pl. iv. 682 (1843).

Tejon Cañon (No. 1220).

Leucocrinum montanum Nutt. in Gray, Ann. Lyc. N. Y. iv. 110 (1848). Type locality, "in planitiebus altis fluminis Platte."

About 30 kilometers east of Panaca, Nevada (No. 1976).

Stropholirion californicum Torr. Pac. R. Rep. iv. 149 (1857). Type locality, "in rocky places, Knight's Ferry, Stanislaus River," California.

Valley of Kaweah River (No. 1375).

Brodiæa capitata Benth. Pl. Hartw. 339 (1857). Type locality, "in sylvis prope Monterey," California.

Near Willow Creek, Panamint Mountains (No. 752), at Leach Point Spring (No. 1873), and on Telescope Peak (No. 2032).

Hookera coronaria Salisb. Parad. Lond. ii. t. 98 (1808). Type locality, "in California."

In the valley of Kaweah River (Nos. 1325, 1464).

Triteleia ixioides (Ait. f.) Hort. Kew. ed. 2. ii. 257 (1811), under *Ornithogalum;* Greene, Bull. Cal. Acad. ii. 142 (1887). Type locality, "California."

Near Mammoth, Mono County, California (No. 1818).

Bloomeria crocea (Torr.) Bot. Mex. Bound. 218 (1859), under *Allium*. Type locality, "summit of the mountains east of San Diego, California."

Near Havilah (No. 1069). This is the same as the *Bloomeria aurea* of Kellogg.

Allium anceps Kellogg, Proc. Cal. Acad. ii. 109 (1861). Type locality, "Washoe," Nevada.

About 30 kilometers east of Panaca, Nevada (No. 1972).

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[1] North American Fauna, No. 7, pp. 358, 359 (1893).

[2] Engelm. Trans. St. Louis Acad. iii. 50 (1873).

[3] Engelm. Bot. Gaz. vii. 17 (1882).

Allium bisceptrum Wats. Bot. King Surv. 351 (1871). Type locality, "on stream banks in the mountains, from the Trinity to the East Humboldt Ranges, Nevada, and in the Wahsatch; 6-7,500 feet altitude."

Near Mammoth, Mono County, California (No. 1815).

Allium tribracteatum Torr. Pac. R. Rep. iv. 148 (1857). Type locality, "hillsides, Duffield's Ranch, Sierra Nevada," California.

Near Mineral King, Sierra Nevada (No. 1543).

Allium validum Wats. Bot. King Surv. 350 (1871). Type locality, "East Humboldt and Clover Mountains, Nevada; in high swampy ground; 7-9,000 feet altitude."

Near Mineral King (No. 1402). The stout, persistent rootstocks often attain a diameter of 7 mm.

Lilium pardalinum Kellogg, Proc. Cal. Acad. ii. 12 (1859-60). Type locality Californian.

Valley of the Kaweah River (No. 1359), and near Mammoth (No. 1819). These specimens are somewhat smaller throughout than is usual in the species.

Lilium parvum Kellogg, Proc. Cal. Acad. ii. 179 (1862). Type locality, in California or Nevada.

Valley of the South Merced River (No. 1841). The specimens collected bear from 1 to 23 flowers each.

Fritillaria atropurpurea Nutt. Journ. Acad. Phila. vii. 54 (1834). Type locality, "on the borders of the Flat-Head river."

Near Mineral King (Nos. 1480, 1512).

Calochortus flexuosus Wats. Amer. Nat. vii. 303 (1873). Type locality, "Southern Utah and Northern Arizona."

Big Horn Cañon, Grapevine Mountain (No. 978), and at Cottonwood Springs, Nevada (No. 1877).

Calochortus invenustus Greene, Pittonia, ii. 71 (1890). Type locality, "the higher mountains to the westward of the Mohave Desert."

Near Lone Pine (No. 955), and in the Tejon Mountains (No. 1179), the latter determined by E. L. Greene. The plant was found only in the chaparral belt of the Sierra Nevada.

Calochortus kennedyi Porter, Bot. Gaz. ii. 79 (1877). Type locality, "Kern County, California."

On the Darwin Mesa, California (No. 795), and in Esmeralda County, Nevada (No. 2006). No. 795 is the typical plant with scarlet-orange flowers. No. 2006 has yellow flowers similar in color to those of *C. aureus*, but the structure of the plant throughout is that of *C. kennedyi*, the inner perianth parts lacking the brown crescent of *C. aureus*, but bearing the long hairs and blackish brown claw of the other species.

Calochortus nudus Wats. Proc. Amer. Acad. xiv. 263 (1879). Type locality, "in the Sierra Nevada [California], Yosemite Valley to Plumas County."

Near Mineral King (No. 1447). If the *C. elegans subclavatus* (probably a misprint for *subcalvatus*) of Baker[1] is really the same as our plant, that varietal name should be adopted for the species.

Calochortus nuttallii Torr. & Gr. Pac. R. Rep. ii. pt. ii. 121 (1855). Type locality, "summit of Noble's Pass, Sierra Nevada, California."

Near Farewell Gap, Sierra Nevada (No. 1743).

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[1] Journ. Linn. Soc. xiv. 305 (1875).

Calochortus venustus Benth. Trans. Hort. Soc. Lond. ser. 2. i. 412. (1831-35)—Dougl. MS. Type locality Californian.

In the southern Sierra Nevada (Nos. 1097, 1176).

Calochortus venustus purpurascens Wats. Proc. Amer. Acad. xiv. 266 (1879). Type locality Californian but not definitely given.

In the Tejon Mountains (No. 1177). The three inner parts of the perianth have in some cases a deep purple color, in others a coppery brown.

Veratrum californicum Durand, Pl. Pratt. 103 (1855). Type locality, "on Deer Creek, one of the affluents of the Sacramento river," California.

Near Mineral King (No. 1465).

Zygadenus venenosus Wats. Proc. Amer. Acad. xiv. 279 (1879). Type locality not given; range "California (Monterey and Mariposa Counties) to British Columbia and east to Utah and Idaho."

Near Mineral King (No. 1538).

JUNCACEÆ.

Juncus balticus Willd. Berlin. Mag. iii. 298 (1809). Type locality, "an den sandigen Meeresufern bei Warnemünde," Germany.

Nos. 12, 21, 218, 226, 227, 362, 711, 1125, 1634, 1715. In the hope that some new facts concerning the structure and distribution of the forms of this species might be learned, care was taken to observe all the variations of *J. balticus*, and to collect the variant forms, together with their intergrades. In the lower altitudes of both the San Bernardino Valley and the Mohave Desert region occurs a *Juncus* with compressed stems, and often with a well-developed radical leaf. This plant has therefore the distinctive characters of *Juncus mexicanus*, and, although I have been unable to compare it with the type specimen, undoubtedly belongs to that species. Between this form and the terete-stemmed, leafless *J. balticus* of the Sierra Nevada there exists a perfect series of intergrades. One of the specimens (No. 1125, from the salt marsh of Tehachapi Lake) presents from the large size of its flowers very nearly the appearance of *J. leseurii*. For the present the name *Juncus balticus* is applied to the whole collection.

Throughout the desert region in every permanently moist place, especially those in which there is a decided element of alkali, this plant is abundant. At Ash Meadows it forms an important part of the natural pasturage. The higher altitudes of the desert mountains were not examined at a season when the presence or absence of the plant could be ascertained, but in the Sierra Nevada (Nos. 1634, 1715) specimens were collected as high up as Whitney Meadows, at an altitude of about 3,000 meters.

Juncus bufonius L. Sp. Pl. i. 328 (1753). Type locality European.

Isolated specimens of this cosmopolitan *Juncus* were seen in a few out-of-the-way spots of moist soil in Willow Creek Cañon, Panamint Mountains (No. 810); on the North Fork of Kern River, near Kernville; and at Willow Spring, Antelope Valley.

Juncus cooperi Engelm. Trans. St. Louis Acad. ii. 590 (1868). Type locality, "Camp Cady, in the southern part of the State of California."

On the evening of our arrival at Bennett Wells I walked eastward from camp a few hundred meters to the margin of the salt-marsh in the bottom of the valley, and there, amidst the other vegetation peculiar to the densely alkaline moist soil of the place, I found in fruit a *Juncus* (No. 204) evidently related to, but clearly distinct from, both *J. ræmerianus* and *J. acutus sphærocarpus*. A subsequent exami anth
showed it to be the long-lost *J. cooperi*. It was later found in several *ngistylis.*
Death Valley: about the old Eagle Borax Works, on the east side of
opposite Bennett Wells, near the Coleman Borax Works, about 6.5 kilo ality, "on
of Furnace Creek Ranch, 3 kilometers east of the same ranch in Furnace m Colorado.
(No. 582), and at Saratoga Springs. Eastward from Death Valley i

several places in Resting Springs Valley, California, and at Ash Meadows, Nevada, points in the watershed of the Amargosa River, and in the Vegas Wash, Nevada, about 13 kilometers from the great bend of the Colorado River. West of Death Valley it was seen only at Hot Springs, Panamint Valley.

At all its stations the plant grows in soil like that described above, and in tufts sometimes of only a few stems or occasionally attaining the extraordinary diameter of 2 meters. Upon the new material collected the following description is based:

Plant perennial, densely tufted, 60 to 80 cm. high; roots large, unbranched, and 2 to 3 mm. in diameter near the base, the parenchyma unusually thick; rootstocks short, stout, closely branched; stems erect, rigid, terete or slightly compressed, striate, leafless between the infloresence and the base; lower sheaths light brown, shining, the blade reduced to a filiform-aristate appendage about 10 mm. long; upper 1 to 4 sheaths stramineous to light green, bearing a stiffly erect, spine-pointed, terete blade exactly resembling the stem; inflorescence anthelate, its lower leaf erect, exceeding the panicle, about 10 cm. or less in length, similar to the upper basal leaves; branches of the inflorescence erect or nearly so, 8 cm. long or much shorter, mostly unbranched, terminated by a 4- to 10-flowered glomerule; flowers borne singly in the axils of hyaline, scarious, cuspidate bracts, the very short pedicel bearing two prophylla; sepals 5 to 6 mm. long, oblong, lanceolate, cuspidate, coriaceous, shining, plainly but not prominently few-nerved, scarious-margined; inner sepals shorter, barely cuspidate; stamens 6, nearly equaling the inner sepals; anthers when moist about 2.5 mm. long by 1 mm. wide; ovary oblong, equaling the included style; stigmas 2 to 2.5 mm. long; capsule narrowly oblong, acute, 3-sided, exceeding the sepals by 1 mm. or less, rigid-coriaceous, 3-celled, valves spreading but slightly in dehiscence; seeds closely packed and misshapen, with a conspicuous raphe and short tails, body about 1 mm. long, oblong, reticulate, the areas themselves smooth or faintly reticulate, not transversely lineolate.

This rush is most nearly related to Engelmann's *Juncus acutus sphærocarpus* (*J. robustus* Wats.) and, less closely, to *J. rœmerianus*. It agrees with both in its stiff, erect, stem-like, pointed leaves, pseudo-lateral inflorescence, and prophyllate, glomerate flowers; and differs crucially from both in its simpler inflorescence and much larger flowers and fruit, from the former additionally in its cuspidate sepals and narrower capsule, and from the latter in its rigid, coriaceous sepals.

Since making the observations on the Death Valley specimens I have found in the National Herbarium, under the name *J. compressus*, a specimen of *J. cooperi*, collected by C. R. Orcutt, in 1888, at Borrego Springs, Colorado Desert, California. It is probable, therefore, that the species will be found in these deserts of southeastern California, still more widely distributed. Mr. S. B. Parish informs me that he has looked carefully for the plant at Camp Cady, its type locality, but has failed to find it. Dr. Cooper undoubtedly collected the plant farther out in the desert than has been supposed, in some alkaline marsh.[1]

Juncus dubius Engelm. Trans. St. Louis Acad. ii. 459 (1868). Type locality, "in Clark's meadow, near the Big Tree Grove, Mariposa, California, at an altitude of 6,500 feet."

Near Visalia (No. 1276), and in the valley of Kaweah River (Nos. 1308, 1754).

Juncus effusus L. Sp. Pl. i. 326 (1753). Type locality European.

In the valley of the Kaweah River (Nos. 1302, 1334). The flowers and capsules of these specimens are unusually small.

Juncus nevadensis Wats. Proc. Amer. Acad. xiv. 303 (1879). Type locality, "in Sierra Nevada, from Kern County to Oregon."

Calo361, 1498, 1525, 1588, 1644, 1652, 1673, 1717, 1721, 1727. 1731, 2095. These speci-
cality, "collected in the Sierra Nevada, constitute a series ranging from typical
Near Fa

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[1] Emended from Bull. Torr. Club, xix. 309–11 (1892).

nevadensis to a form somewhat resembling *J. mertensianus*. No. 1588 consists of fruiting specimens of typical *J. nevadensis* 60 to 75 cm. in height, and with panicles of 7 to 9 glomerules. The anthers are about 1.2 mm. long, twice as long as the filaments; the capsules pale brown and tapering into a well-defined beak; the seeds 0.4 to 0.5 mm. long, oblong, lightly reticulate, with about 15 main costæ and slender ones between, the areas iso-diametrical (half-areas oblong) and smooth or inclined to be transversely lineolate. The specimens of No. 1717 are 15 to 25 cm. high and bear 1 or 2 glomerules. Their anthers are about 0.8 mm. long, equaling the filament; the capsule castaneous at the apex, obtuse, mucronate; and the seeds 0.5 to 0.7 mm. long, about 25-costate, deeply reticulate, with iso-diametric smooth areas. This is a reduced form externally resembling, but distinct from, true *J. mertensianus*, and between it and No. 1588 the other numbers show all gradations, in about the following order: 1588, 1311, 1727, 1721, 1731, 1644, 2095, 1525, 1673, 1652, 1498, 1717. The smaller plants came from higher altitudes. No. 1652 has anthers 1.9 mm. long. None of the true *J. mertensianus* was found.

Juncus nodosus L. Sp. Pl. ed. 2. i. 466 (1762). Type locality, "in America septentrionali."

The discovery of this plant in a desert of southern Nevada, at an altitude of about 1,100 meters, is, from what we at present know of the distribution of the species, most remarkable. The three dried specimens were collected at Ash Meadows, Nevada (No. 345), in an alkaline moist meadow, in midwinter, with the inflorescence in one case preserved intact. They show the precise characters of the eastern specimens both in size, habit, and general appearance, as well as in perianth, stamens, and seeds. The specimens were found scattered in a growth of *Lythrum album*, *Fimbristylis thermalis*, *Eleocharis rostellata*, *Erythræa nuttallii*, and *Juncus balticus*. The locality abounded in water-fowl, and the seeds of many of these marsh plants are undoubtedly transported by them.

Juncus nodosus megacephalus Torr. Fl. N. Y. ii. 326 (1843). Type locality, "on the shores of Lake Ontario."

Along an irrigating ditch near Bakersfield (No. 1241).

Juncus orthophyllus.

Type locality, "Californian Sierras on alpine meadows or along rivulets in the Yosemite Valley, alt. 4,000 ft." This is *Juncus latifolius* (Engelm.) Trans. St. Louis Acad. ii. 496 (1868), as *J. longistylis latifolius;* Buchenau, Monogr. Junc. 425 (1890), not *J. latifolius* Wulf (1789).

In and near Whitney Meadows (Nos. 1636, 1639) and at Soda Springs (No. 1589). The specimens numbered 1639 are exact counterparts of Engelmann's Herbarium Normale, No. 44, with spreading leaves 5 mm. or less wide and stems 25 cm. high. No. 1636 has still more spreading leaves, some of them 6 mm. wide and less than 50 mm. long, and stems about 10 cm. high.

The plant was found in the natural meadows of the Sierra Nevada, growing usually at an altitude higher than that of the type locality. Engelmann states with the original description that it grows also on the upper Tuolumne at an altitude of 10,000 feet. In Whitney Meadows the plants grow in short, close grass, and their pale green leaves spread widely, so that they form a conspicuous part of the turf. Specimens collected in other parts of the Sierra Nevada have erect and usually narrower leaves and taller stems, apparently due to their growing in taller grass. Such plants closely resemble *J. longistylis*, and the external characters for distinguishing the two species appear to be reduced to two: the roughness of the perianth parts and the absence of auricles on the leaf-sheaths, in *J. orthophyllus;* and the smoothness of the perianth parts and the presence of well-defined auricles on the leaf-sheaths, in *J. longistylis*.

Juncus parryi Engelm. Trans. St. Louis Acad. ii. 446 (1866). Type locality, "on the western and north-western mountains." Parry's specimens came from Colorado.

Near timber-line in the Sierra Nevada (No. 1421, 1503, 1718).

Juncus phæocephalus paniculatus Engelm. Trans. St. Louis Acad. ii. 484 (1868). Type locality, "in the lowlands, Napa Valley, San Francisco, and in the mountains."

In Owens River Valley (Nos. 901, 1774).

Juncus rugulosus Engelm. Bot. Gaz. vi. 224 (1881). Type locality, "in a running streamlet at the [south] foot of the San Bernardino Mountains," California.

Dr. Franz Buchenau, in his recent Monograph of the Juncaceæ,[1] refers this curious species to *J. dubius*, as a form with wrinkled epidermis, citing as analogous cases among other species of *Juncus* the identity of *J. rudis* with *J. microcephalus*, and *J. rugosus* with *J. acutiflorus*. After an examination of several specimens of both plants I am able to find but one character, in addition to the wrinkled epidermis, which may serve to distinguish them, namely, the size of the anthers. In *J. dubius* they are large, two to four times the length of the filaments, while in *J. rugulosus* they are much smaller, rarely equaling the filaments, usually only one-half or one-third as long. Fully matured seeds of *J. dubius* I have not seen. For the present it is not desirable to unite the plants under the name *J. dubius*, and further observations on their intergradation and their range are needed; yet it will probably be found that they are not specifically distinct.

Collected near San Bernardino (No. 14), and near Castac Lake (No. 1148).

Juncus subtriflorus (Mey.) Linnæa, iii. (1828), as *J. compressus subtriflorus*. Type locality, "Unalaschka." This is an older name for *J. drummondii* Mey. in Ledeb. Fl. Ross. iv. 235 (1853).

Near timber-line in the Sierra Nevada (Nos. 1540, 1563, 2080). The plants of No. 1563 are very large, reaching 50 cm. in height. They grew on a shaded, moist slope among some granite boulders. The specimens of No. 2080 are not more than 10 cm. high, and in some cases the sheaths have produced blades 4 cm. long. They answer to Engelmann's *J. drummondii humilis*.

Juncus xiphioides Mey. Syn. Junc. 50 (1822). Type locality, "in Nova Hispania prope Real del Monte," an error for Monterey, California.

Nos. 710 and 969 are robust plants with thick stems 0.7 to 1.4 meters high, inclined to be procumbent at the base and the inflorescence in less open panicles. They grew in turf on the banks of mountain rivulets. Nos. 1253 and 1734 are plants of about the same height but more slender and quite erect. Their panicles are large and loose, being in one specimen of No. 1734 30 cm. long and bearing 184 glomerules. No. 1253 grew in the rich mud of a partially dried roadside ditch, No. 1734 in the shallow margin of a lake.

The plant was seen in Surprise (No. 710), Willow Creek, Mill Creek, and Cottonwood (No. 969) cañons, Panamint Mountains; at a spring on the east slope of Walker Pass; in the Cañada de las Uvas; near Visalia (No. 1253); and at the smaller of the lakes on Kern River (No. 1734).

Juncus xiphioides montanus Engelm. Trans. St. Louis Acad. ii. 481 (1868). Type locality of the smaller-headed form, "Arizona, N. Mexico, and west Texas."

In the valley of the Kaweah River (No. 1327).

Juncoides campestre (L.) Sp. Pl. i. 329 (1753), under *Juncus;* Kuntze, Rev. Gen. Pl. ii. 722 (1891). Type locality European.

Valley of the Kaweah River (No. 1353). This is the *Luzula campestris* of De Candolle.

Juncoides campestre sudeticum (Willd.) Sp. Pl. ii. 221 (1799), as *Juncus sudeticus*. Type locality, "in sudetis Silesiæ summis humidis."

At timber-line in the Sierra Nevada, near Mineral King (No. 1553). This alpine *Juncoides*, although widely distributed in the alpine regions of the Old World, seems to be extremely rare on this continent. I have seen American specimens heretofore only from Bering and St. Paul islands. It was collected by Charles Wright, on the Ringgold and Rogers Expedition, on the adjacent Russian island of Arakamtschetschene.

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[1] Engler, Bot. Jahrb. xii. 351 (1890).

Juncoides divaricatum (Wats.) Proc. Amer. Acad. xiv. 302 (1879), under *Luzula*. Type locality, "in the Sierra Nevada [California], mostly alpine, from above Mono Lake to Sierra County."

Dr. Franz Buchenau[1] has referred this species of *Juncoides* to *J.* [*Luzula*] *parviflorum* without a varietal designation. It is, however, easily distinguishable from that species, and so far as is at present known does not intergrade with it. Its conspicuous character, the divaricate inflorescence, does not always distinguish it from *J. parviflorum*, for the same feature sometimes occurs in that species also. But *J. divaricatum* has a short stature (16 to 23 cm.), a large, full-flowered inflorescence (5 to 11 cm. high), and no pilosity whatever upon the leaves. The yearly growth of the rootstocks is short, seldom equaling 1 cm. The perianth parts are much more narrowly acuminate than in *J. parviflorum*, and the capsules, not yet mature, are acute.

The species, in its typical form at least, has been collected only in the Sierra Nevada. Our specimens grew at timber-line near Mineral King (No. 1542), and therefore at a higher altitude than *J. parviflorum*, in well-drained granitic soil, shaded by boulders.

Juncoides parviflorum (Ehrh.) Beitr. vi. 139 (1791), under *Juncus*. Type locality European. This is the *Luzula spadicea* of most American authors, not of De Candolle.

Near Whitney Meadows in the Sierra Nevada (No. 1707).

Juncoides spicatum (L.) Sp. Pl. i. 330 (1753), under *Juncus;* Kuntze, Rev. Gen. Pl. ii. 725 (1891). Type locality European.

This species of *Juncoides* occurs in the high mountains and arctic region of northern Europe and Asia. In eastern America it ranges from Hudson Bay southward to the White Mountains of New Hampshire, and in the Rocky Mountains from British Columbia southward to Colorado. West of the Rocky Mountain region it has been collected in the mountains of Utah and Nevada, in Kotzebue Sound, and in Vancouver Island, and now for the first time is reported from the Sierra Nevada of California. It grew at timber-line near Mineral King (No. 1535).

TYPHACEÆ.

Typha angustifolia L. Sp. Pl. ii. 971 (1753). Type locality European.

This, the cat-tail, is not an abundant plant in the desert marshes, but it occurred sparingly at several points, as follows: at Furnace Creek, Death Valley; in Resting Springs Valley; at Winters's ranch, Pahrump Valley; at Ash Meadows; at Vegas Ranch; in Willow Creek Cañon, Panamint Mountains; on the South Fork of Kern River; in Walker Basin, and at several points in the Tulare Plains. The specimens seen were not always distinguishable from *T. latifolia*, so that some of the stations cited may belong really to that species.

Typha latifolia L. Sp. Pl. ii. 971 (1753). Type locality European.

This species of cat-tail occurred in the Tulare Plains at several points between Bakersfield and Visalia.

Sparganium minimum Fries. Summ. Veg. 560 (1849). Type locality European.

In the Devil Hole, Ash Meadows, Nevada (No. 368), and near Whitney Meadows in the Sierra Nevada (No. 1692). These specimens are without fruit, therefore not positively identifiable, but Dr. Morong considers them probably of this species.

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[1] Monogr. Junc. 111 (1890).

LEMNACEÆ.

Lemna valdiviana Phil. Linnæa, xxxiii. 239 (1864).

Observed in the upper spring at Vegas Ranch (No. 401); near Lone Pine; on the South Fork of Kern River; in Walker Basin; and at Willow Spring, Antelope Valley.

ALISMACEÆ.

Alisma plantago L. Sp. Pl. i. 342 (1753). Type locality European.

Near Visalia (No. 1274).

NAIADACEÆ.

Triglochin maritimum L. Sp. Pl. i. 339 (1753). Type locality European.

In a small alkaline meadow near an open pond, a few miles south of the middle station, on the road from Searles's to Mohave this plant occurs, growing with *Juncus balticus* and other paludose plants.

Triglochin palustre L. Sp. Pl. i. 338 (1753). Type locality European.

Near Mineral King (No. 1433).

Potamogeton[1] **foliosus** Raf. Med. Repos. hex. 2. v. 354 (1808). Type locality, as given by Michaux, Fl. i. 102 (1803), "in rivis affluente mari inundatis Carolinæ inferioris."

Valley of the North Fork of Kern River (No. 1585).

Potamogeton foliosus niagarensis (Tuckerm.) Amer. Journ. Sci. ser. 2. vii. 354 (1849), as *P. niagarensis;* Morong, Mem. Torr. Club, iii. no. 2. 39 (1839). Type locality, "Niagara Falls, near the brink of the Hog-back."

In a stream in Walker Basin (No. 1092), and in an irrigating ditch near Visalia (No. 1243).

Potamogeton heterophyllus Schreb. Spic. Fl. Lips. 21 (1771). Type locality European.

Near Whitney Meadows (No. 1693). This is a small form with tuberous rootstocks like the variety *myriophyllus.*

Potamogeton lonchites Tuckerm. Amer. Journ. Sci. ser. 2. vi. 226 (1848). Type locality, "in the Charles [River] at Newton and Natick," Massachusetts.

Near Bakersfield (No. 1244), and near Visalia (No. 1278).

Potamogeton spirillus Tuckerm. Amer. Journ. Sci. ser. 2. vi. 228 (1848). Type localities, "in the Charles and in the Mystic [rivers], and also in the Middlesex canal," Massachusetts.

Near Visalia (No. 1283).

Ruppia maritima L. Sp. Pl. i. 127 (1753). Type locality European.

This seaboard aquatic was found only in the large pool at Saratoga Springs (No. 306); in a pool at Hot Springs (Nos. 683, 729); in Tehachapi Lake; and in Castac Lake (No. 1147). No. 306 was without flowers or fruit.

Zannichellia palustris L. Sp. Pl. ii. 969 (1753). Type locality, "in Europæ, Virginiæ fossis, fluviis."

In the large spring at Vegas Ranch (No. 399); in the spring by the old adobe house between Keeler and Lone Pine; in springs near Little Owens Lake; in pools along the South Fork of Kern River; and in Willow Spring and Crane Lake, Antelope Valley.

Naias marina L. Sp. Pl. ii. 1015 (1753). Type locality European.

In a spring at Ash Meadows, Nevada (No. 371).

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[1] The specimens of *Potamogeton* have been identified by Dr. Thomas Morong.

CYPERACEÆ.

Cyperus acuminatus Torr. & Hook. in Torr. Cyp. 435 (1836). Type locality, "near St. Louis, Missouri."
Near Three Rivers (No. 1285).

Cyperus aristatus Rottb. Descr. & Icon. 23 (1773). Type locality not given. Specimens were seen on the North Fork of Kern River, near Kernville, and others were collected near Visalia (No. 1273).

Cyperus diandrus capitatus Britton, Bull. Torr. Club. xiii. 205 (1886). Type locality not given; range, "Texas and northern Mexico to California."
Near San Bernardino (No. 26).

Cyperus lævigatus L. Mant. Pl. ii. 179 (1771). Type locality, "ad Cap[ut] b[onæ] spei."
Near Little Owens Lake (No. 1006).

Eleocharis acicularis (L.) Sp. Pl. i. 48 (1753), under *Scirpus*; R. & S. Syst. Veg. ii. 154 (1817). Type locality European.
Near Visalia (No. 1269) and near Whitney Meadows (No. 1642).

Eleocharis atropurpurea (Retz.) Obs. Bot. v. 14 (1789), under *Scirpus*; Kunth, Enum. Pl. ii. 151 (1837).
Near Visalia (No. 1270). This species is now reported from California for the first time. In all the other American specimens that I have examined the perianth-bristles are present and are equal to or slightly shorter than the achenium, but in this plant the bristles are entirely wanting. The same variation in this species has been noted in other parts of the world.

Eleocharis capitata (Willd.) Sp. Pl. i. 294 (1797), under *Scirpus*; R. Br. Prodr. Fl. Nov. Hol. i. 225 (1810). Type locality, "in Virginia inque insulis Caribaeis."
Near San Bernardino (No. 20).

Eleocharis montana (H. B. K.) Nov. Gen. & Sp. i. 226 (1815), under *Scirpus*; R. & S. Syst. ii. 153 (1817). Type locality, "in monte Quindiu [United States of Colombia], alt. 1600 hex."
Near San Bernardino (No. 15).

Eleocharis palustris (L.) Sp. Pl. i. 47 (1753), under *Scirpus*; R. & S. Syst. Veg. ii. 151 (1817). Type locality European.
About Tehachapi Lake (No. 1123) and near Visalia (No. 1255).

Eleocharis parishii Britton, Journ. N. Y. Micros. Soc. v. 111 (1889). Type locality, "Agua Caliente, San Diego Co., Cal."
On the west shore of Owens Lake (No. 999) and on the eastern slope of Walker Pass (No. 1014). Our specimens show, as the type specimens did not, that the plant is abundantly supplied with slender, creeping rootstocks. The plant has not been reported since its first collection. No. 1014 was determined by Dr. N. L. Britton.

Eleocharis rostellata Torr. Cyp. 318 (1836), under *Scirpus*; Torr. Fl. N. Y. ii. 347 (1843). Type localities, "Pen-Yan, Yates county, New York," and "South Carolina."
This is the common *Eleocharis* of the desert, and forms an important part of the herbage of well-watered desert meadows. It was recorded at the Eagle Borax Works, Death Valley; about the springs and the ditch in Furnace Creek Cañon (Nos. 232, 236, 586); at Resting Springs; at Twelve Mile Spring, Resting Springs Valley (No. 283); at Mountain Spring in Furnace Creek Cañon; at Ash Meadows; in Johnson Cañon, at the lower Indian gardens (No. 566); at Hot Springs, Panamint Valley;

near Lone Pine (No. 902); and along the west shore of Owens Lake (No. 1000). The plant grows in soil constantly watered and usually sufficiently fresh to drink. The stems grow sometimes quite short, only 10 or 15 cm., and occasionally very tall. At the mouth of Furnace Creek Cañon stems measuring 2.23 meters long were found, reclining upon the adjacent rank herbage. Such long stems often fell over and, lying in a moist place, took root at the apex and formed new plants.

Fimbristylis thermalis Wats. Bot. King Surv. 360 (1871). Type locality, "near the Hot Springs in Ruby Valley, Nevada; 6,000 feet altitude."

This sedge, unlike most of the paludose plants with which it is associated, is confined to the desert region and southern intramontane California. It occurred about the springs in Furnace Creek Cañon (No. 237); in a marsh at Twelve Mile Spring, Resting Springs Valley; and on Watkins's ranch, Ash Meadows. Its habitat was wet, alkaline, grassy soil.

Fimbristylis vahlii (H. B. K.) Nov. Gen. & Sp. i. 221 (1815), under *Isolepsis;* Link, Hort. Berol. i. 287 (1827). Type locality, "in arenosis Orinoci inter ostia fluminis Apure et villam El Capuchino."

Near Visalia (No. 1271). This species appears not to have been reported before from the Pacific region of the United States.

Scirpus americanus Pers. Syn. Pl. i. 68 (1805). Type locality, "in Carolina inferiore." This is the same as *S. pungens* Vahl.

Frequent in the margins of marshes throughout the desert, commonly growing near *S. olneyi*, but in drier soil. Specimens were collected in Resting Springs Valley (No. 272); at Furnace Creek Ranch (No. 572); in Surprise (No. 718) and Cottonwood (No. 974) cañons, Panamint Mountains; and in the valley of the Virgin (No. 1904).

Scirpus lacustris occidentalis Wats. Bot. Cal. ii. 218 (1880). Type locality, "from San Diego County [California] to British Columbia and eastward to Texas and Colorado."

This marsh plant did not occur over large areas at any point in the desert. If was found at the Eagle Borax Works and at those near Furnace Creek, in Death Valley; at Ash Meadows; along Owens River and about Owens Lake; along the South Fork of Kern River; about Tehachapi Lake; at the north end of Castac Lake; and in marshy land throughout the Tulare Plains. Specimens were collected in the smaller of the Kern River Lakes, in the Sierra Nevada (No. 1736). The so-called tule marshes of the desert are oftener made up of *Scirpus olneyi* than of this species.

Scirpus maritimus L. Sp. Pl. i. 51 (1753). Type locality European.

This plant was found in the desert at the Eagle Borax Works, at Furnace Creek, at the borax works near the latter place, and at Saratoga Springs, stations all in Death Valley. Westward it was found about Tehachapi Lake (No. 1124), and in the Tulare Plains, near Bakersfield (No. 1240). The species requires a more saline soil than *Scirpus lacustris occidentalis.*

Scirpus microcarpus Presl, Rel. Haenk. i. 195 (1828). Type locality, "in Nootka-Sund, aut in portu Mulgraaviano."

Lyon Meadow, Sierra Nevada (No. 1577).

Scirpus nevadensis Wats. Bot. King Surv. 360 (1871). Type locality, "shore of Soda Lake in Carson Desert, Nevada."

The rootstock of this plant is 3 to 7 mm. thick, with distant and, in age, torn and evanescent scales, and creeps along beneath the surface of the sandy alkaline soil in which it grows, at a depth of 10 to 20 cm., often attaining a length of a meter or more. At intervals of a few centimeters it sends up slender, nearly erect branches clothed with scales, and from the tops of these branches the stems are developed, at first single, after a few years clustered. *S. nevadensis,* although widely different from the eastern typical form of *S. americanus*, is clearly derived from that species. Small, starved specimens of the latter from western Texas, New Mexico, Arizona, and southern Utah have a close general resemblance to *S. nevadensis*, even to the rounded leaf-backs and slightly serrate leaf-tips.

The species was found only on the shores of Owens Lake, near Keeler (No. 857), and between Lone Pine and Olancha.

Scirpus olneyi Gray, Man. 526 (1848). Type locality, "salt marshes, Martha's Vineyard, Rhode Island, and New Jersey."

Although herbarium specimens of this species and *S. americanus* from the eastern United States are easily distinguished, I have experienced difficulty in separating the two as they occur in the Southwest. The extreme forms there are, however, clearly distinguishable, especially in the field. *S. americanus* grows about 0.6 meter high, in firm, usually gravelly soil on the margins of streams and ponds, while its rootstocks are slender, seldom exceeding 3 mm. in diameter, and bearing scattered stems. *S. olneyi*, on the other hand, grows often 1.5 meters high, in soft, deep muck, and with the stems set close together on the thicker (sometimes 1 cm.) rootstocks. A few attempts at riding through patches of *S. olneyi* resulted in each instance in the horse sinking and plunging, and barely getting out. So uniformly indicative of a mire was the plant that it was always avoided when riding in a swamp.

This was the common triangular-stemmed sedge of the desert marshes. It was found nearly everywhere, in Owens, Panamint, Death (Nos. 233, 569), Amargosa, and Vegas valleys. In this region the name *tule* is applied to the tall, coarse vegation of a marsh, of whatever plants it may be composed. Most of such marsh vegetation is made up of this species. The plant was not found in the Tulare Plains.

Scirpus pauciflorus Lightf. Fl. Scot. ii. 1078 (1777). Type locality, "upon the Highland Mountains, as upon Malghyrdy, in Breadalbane," Scotland.

Whitney Meadows (No. 1616).

Schœnus nigricans L. Sp. Pl. i. 43 (1753). Type locality European.

The range of this plant appears to follow none of the recognized rules of plant distribution. In the Old World it is known to occur in nearly all the countries of continental Europe, in several of the Mediterranean islands, in northern Africa, in southern Africa, in the Caucasus Mountains, and in the Baikal Mountains of southern central Siberia; in America it has been found thus far only in Florida and in southern California. Mr. S. B. Parish has collected the plant at Anaheim Hot Springs, and in Lone Pine Cañon, near Cajon Pass, San Bernardino Mountains; and it is now reported from the springs in Furnace Creek Cañon, Funeral Mountains (Nos. 229, 580), and from a small marsh about half a mile south of the Devil Hole, Ash Meadows, Nevada. The American plant is not differentiated from the European in any noticeable detail. In the two stations in which it was found by the expedition it occurred in wet, alkaline, calcareous soil.

Cladium mariscus (L.) Sp. Pl. i. 42 (1753), under *Schœnus;* R. Br. Prodr. Fl. Nov. Holl. i. 236 (1810). Type locality European.

Our southern species of *Cladium*, originally described by Torrey as *C. effusum*, occurs abundantly in the southern Atlantic States, and sparingly in the Great Basin (Arizona and Nevada) and on the southern Pacific coast. It is widely distributed in the warmer regions of the world, extending unusually far northward in Europe. Dr. Watson has described[1] our Western form as a variety, *californicum*, yet it is identical with others from Asia Minor and the Sandwich Islands, which Bœckeler has referred without comment to *C. mariscus*.

This was first seen about the springs in Furnace Creek (No. 231); in the margins of spring pools at the southern end of Resting Springs Valley; at Winters's ranch, Pahrump Valley; and at Watkins's ranch, Ash Meadows. The plant is confined to the marshy alkaline soil in the vicinity of springs, where it seldom occurs in abundance, but, in the last locality mentioned above, small areas of the open marsh are covered with it to the exclusion of all other large plants.

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[1] Bot. Cal. ii. 224 (1880).

Carex[1] **ablata** Bailey, Bot. Gaz. xiii. 82 (1888). Type locality not given.

In a natural meadow near Mineral King, Sierra Nevada (Nos. 1426, 1437).

Carex amplifolia Boott in Hook. Fl. Bor. Amer. ii. 228 (1839). Type locality, "Columbia River."

In the valley of Kaweah River (No. 1354).

Carex atrata L. Sp. Pl. ii. 976 (1753). Type locality European.

Above timber line on Mount Whitney (No. 2073). [The nearest approach to the true variety *nigra* of the Alps which I have seen in this country.—L. H. B.]

Carex aurea Nutt. Gen. ii. 205 (1818). Type locality "on the shores of Lake Michigan."

Near Mineral King (No. 1429).

Carex breweri Boott, Ill. Gen. Carex, iv. 142 (1867). Type locality, "California, on Mount Shasta, 7,000-10,000 ft., in dry volcanic soil."

Above timber-line near Whitney Meadows (No. 1669).

Carex canescens dubia Bailey, Bot. Gaz. ix. 119 (1884). Type locality, "Bear River Cañon, Utah."

Near Mineral King (No. 1506). [Rare. Bear River Cañon, Utah; Wasatch Mountains, Utah; Blue Mountains, eastern Oregon.—L. H. B.]

Carex deweyana bolanderi (Olney) Proc. Amer. Acad. vii. 393 (1868), as *C. bolanderi*; W. Boott, Bot. Cal. ii. 236 (1880). Type locality, "California, Yosemite Valley and Mariposa Big-tree Grove."

Valley of Kaweah River (No. 1344).

Carex festiva Dewey, Amer. Journ. Sci. xxix. 246 (1836). Type locality, "at Bear Lake and on the Rocky Mountains." Collected by Richardson.

Mineral King (No. 1405) and Whitney Meadows (No. 1615).

Carex festiva stricta Bailey, Mem. Torr. Club, i. 51 (1889). Type localities, "California" and "Buck Creek, Oregon."

Near Mineral King (No. 1500). [This is a well-marked but very puzzling *Carex*, standing midway between *C. festiva* and *C. straminea*.—L. H. B.]

Carex filifolia Nutt. Gen. ii. 204 (1818). Type locality, "on the dry plains and gravelly hills of the Missouri."

Near Mineral King (No. 1505).

Carex filiformis latifolia Boeck. Linnæa, xli. 309 (1877). Type locality, "America septentr[ionali]."

Near Mineral King (No. 1438).

Carex incurva Lightf. Fl. Scot. ii. 544 (1777). Type locality European.

Above timber-line on a mountain slope near Mount Whitney (No. 2067). [Rare in America. This and *Carex atrata* are the only really boreal or alpine *Carices* in the collection.—L. H. B.]

Carex jonesii Bailey, Mem. Torr. Club, i. 16 (1889). Type locality, "Soda Springs, Nevada County, Cal., 7,000 feet."

Near Mineral King (No. 1428).

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[1] The specimens of the genus *Carex* have been identified by Professor L. H. Bailey.

Carex marcida Boott in Hook. Fl. Bor. Amer. ii. 212 (1839). Type locality, "Columbia River."

Near Lone Pine (No. 2164).

Carex multicaulis Bailey, Bot. Gaz. ix. 118 (1884). Type locality Californian.

Valley of Kaweah River (No. 1366).

Carex nebraskensis prævia Bailey, Mem. Torr. Club. i. 49 (1889). Type locality not given.

Surprise Cañon, Panamint Mountains (No. 719).

Carex preslii Steud. Syn. Pl. Glum. ii. 242 (1855). Type locality, "Sinus Notka," i. e. Nootka Sound, Vancouver Island.

At and above timber-line in the Sierra Nevada (Nos. 1661, 2048).

Carex tenella Schk. Riedgr. 23 (1801). Type locality unknown.

Near Whitney Meadows (No. 1697).

Carex tolmiei subsessilis Bailey, Mem. Torr. Club, i. 47 (1889). Type localities, "E. Oregon," and "Gray's Peak, Colorado."

Near Mineral King (No. 1432) and near Whitney Meadows (No. 1706). [*C. tolmiei* is one of the most perplexing of the Western *Carices*, and this variety *subsessilis* is particularly puzzling. In some future revision of the species it will undoubtedly be found to be worthy of specific rank. It is distinguished from the species by the broader and more or less inflated soft perigynium, and by shorter, more sessile spikes. The strongly stoloniferous habit and broad leaves are also characteristic.—L. H. B.]

Carex utriculata minor Boott in Hook. Fl. Amer. ii. 221 (1839). Type localities, "British America," and "Rocky Mountains."

Near Mineral King (No. 1431). [A very much reduced form, which might be mistaken for some forms or *C. monile*.—L. H. B.]

GRAMINEÆ.[1]

Imperata hookeri Rupr. in Anders. Kong. Akad. Stock. Förh. xii. 160 (1855). Type locality, "in Texas."

This was observed along Furnace Creek (Nos. 219, 240); in the south end of Resting Springs Valley; at Ash Meadows; and in Surprise Cañon, near its mouth.

Andropogon macrourus Mx. Fl. i. 56 (1803). Type locality, "a Carolina ad Floridam, in humidis."

Furnace Creek Cañon, Funeral Mountains (No. 210). This grass occurred about springs and streams of fresh water in Furnace Creek Cañon, at Resting Springs, and at Ash Meadows.

Sorghum halepense Pers. Syn. Pl. i. 101 (1805). Type locality, "in Syria et Mauritiana."

A few plants were seen growing along the irrigating ditches at Furnace Creek Ranch, Death Valley (No. 245).

Hilaria mutica (Buckley) Proc. Acad. Phil. 1862, 95 (1863), under *Pleuraphis;* Benth. Journ. Linn. Soc. xix. 62 (1882.) Type locality, "northern Texas."

Near Crystal Spring, Coso Mountains (No. 915). [Not before recorded from California.—G. V.]

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[1] Determined by Dr. George Vasey.

Hilaria rigida (Thurb.) Bot. Cal. ii. 293 (1880), under *Pleuraphis;* Scribner, Bull. Torr. Club, ix. 33 (1882). Type localities, "Fort Mohave and Providence mountains," "Fort Yuma," "Colorado Desert," and "along the Gila River."

The western limit of this grass, for the latitude of Death Valley, is the western foot-slopes of the Charleston Mountains. It was found along the road between Yount's ranch, in Pahrump Valley, and Mountain Springs Pass; on the eastern slope of the mountains, at the same pass; and in the northern end of Vegas Valley, extending a short distance over the divide between Towner's and Ash Meadows. In this vicinity it is a valuable forage grass.

Paspalum distichum L. Sp. Pl. ed. 2. i. 82 (1762). Type locality, "in Jamaica."

Near Visalia (No. 1281).

Panicum crusgalli L. Sp. Pl. i. 56 (1753). Type locality, "in Europæ, Virginiæ cultis."

At Furnace Creek Ranch (No. 242) and near Visalia (No. 1277).

Panicum dichotomum L. Sp. Pl. i. 58 (1753). Type locality, "in Virginia."

Near Three Rivers (No. 1286).

Panicum sanguinale L. Sp. Pl. i. 57 (1753). Type locality, "in America, Europa australi."

Near Visalia (No. 1279).

Phalaris intermedia angusta (Nees) in Mart. Fl. Bras. ii. pt. ii. 28 (1871), as *P. angusta;* Chapm. Fl. 569 (1860). Type localities, "in Brasilia meridionali, loco occuratius haud indicato," and "in America boreali obvia."

Near Visalia (No. 1282), and in the valley of the Virgin River (No. 1924).

Aristida bromoides H. B. K. Nov. Gen. & Sp. i. 122 (1815). Type locality, "in montibus regni Quitensis, juxta Tambo de Guamote et Llanos de Tiocaxas, alt. 1,600 hexap."

In the Funeral Mountains, near Saratoga Springs (No. 259).

Stipa viridula Trin. Mem. Acad. St. Pet. ser. 6. iv. pt. ii. 39 (1838). Type locality, "Am[erica] bor[eali]."

This grass was recorded on Lone Willow Peak, from the springs to the summit; on Browns Peak; in the southern part of the Funeral Mountains, near Saratoga Springs, and west of Amargosa (No. 328); in the Resting Springs Mountains; near Cottonwood Springs, Vegas Valley; in Johnson and Surprise cañons, Panamint Mountains; in a cañon of the Inyo Mountains, near Swansea; between Keeler and Crystal Spring; and on the east slope of Walker Pass. It confines itself principally to rocky mountain slopes, seldom occurring on open mesas, and therefore rarely seen in the bottoms of the desert valleys. It furnishes the best of grazing for stock.

Oryzopsis membranacea (Pursh) Fl. ii. 728 (1814), under *Stipa;* Vasey, Contr. Nat. Herb. i. 56 (1890). Type locality, "on the banks of the Missouri."

This plant, commonly known as sand grass, was of frequent occurrence on sandy or gravelly soil in the upper altitudes of the *Larrea* belt, yet it was seldom sufficiently abundant to furnish an appreciable amount of forage. Specimens were collected on the south slope of Browns Peak (No. 173), in Resting Springs Valley (No. 282), and near Keeler (No. 842).

Phleum alpinum L. Sp. Pl. i. 59 (1753). Type locality European.

Near Mineral King (No. 1400).

Sporobolus airoides (Torr.) Ann. Lyc. N. Y. i. 151 (1824), under *Agrostis;* Thurb. Bot. Cal. ii. 269 (1880.[1]) Type locality, "on the branches of the Arkansas, near the Rocky Mountains."

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[1] This appears to be the first real publication of the name *Sporobolus airoides.*

The recorded stations for this species are at Bennett Wells (No. 203), Furnace Creek (No. 578), Eagle Borax Works, and Saratoga Springs, in Death Valley; in Resting Springs Valley; at Winters's ranch, in Pahrump Valley; at Ash Meadows; in the upper part of Vegas Wash; at Corn Creek, Vegas Valley; near the mouth of Willow Creek Cañon, Panamint Mountains; between Lone Pine and Olancha; and at several points in the Tulare Plains. The grass is abundant at some of these points, as at Bennett Wells, and together with salt grass makes fairly good grazing. It is confined in its range principally to altitudes below 1,000 meters.

Sporobolus asperifolius (Nees & Meyen) in Trin. Agrost. i. 73 (1840), under *Vilfa;* Thurb. Bot. Cal. ii. 269 (1880). Type localities, "Chile; Rio Mayno; Copiapo."

At Furnace Creek Ranch (No. 246) and at Ash Meadows (No. 347), in moist soil.

Sporobolus depauperatus (Hook.) Fl. Bor. Amer. ii. 257 (1840), under *Vilfa*—Torr. MS.; Scribner, Bull. Torr. Club, ix. 103 (1882). Type locality, "N. W. America. Barren sandy parts of the Columbia, from Menzies' island upwards."

In Furnace Creek Cañon (No. 228); in the Resting Springs Mountains (No. 343); at Mountain Springs, Charleston Mountains (No. 375); and in Whitney Meadows (No. 1681). No. 1681 belongs to the form that has been called variety *nodosus.*

Polypogon monspeliensis (L.) Sp. Pl. i. 61 (1753), under *Alopecurus;* Desf. Fl. Atl. i. 67 (1798). Type locality, "Monspelii."

This grass is very frequent about springs of fresh water throughout the desert, and was occasionally seen in similar situations in the intramontane region. Specimens were collected at Furnace Creek Ranch (No. 241), in Surprise (No. 706) and Cottonwood (No. 971) cañons, Panamint Mountains, and near Swansea (No. 876).

Agrostis tenuis Vasey, Bull. Torr. Club, x. 21 (1883). Type locality, "San Bernardino Mts., California."

Whitney Meadows (No. 1679).

Agrostis verticillata Villars, Pl. Dauph ii. 74 (1787).

In Furnace Creek Cañon, Funeral Mountains (No. 579), and about the mouth of Hall Cañon, near Hot Springs, Panamint Valley. The plant grows only in moist soil, little or not at all alkaline.

Deschampsia cæspitosa (L.) Sp. Pl. i. 64 (1753), under *Aira;* Beauv. Agrost. 91 (1812). Type locality European.

Whitney Meadows (No. 1677).

Deschampsia calycina Presl, Rel. Haenk. i. 254 (1830). Type locality, "in montanis Peruviæ."

Willow Creek Cañon, Panamint Mountains (No. 824).

Trisetum barbatum Steud. Syn. Pl. Glum. i. 229 (1855). Type locality, "Chili."

Collected in Johnson Cañon, Panamint Mountains (Nos. 506, 522), and in the valley of the Virgin River, Nevada (Nos. 1907, 1923).

Trisetum spicatum (L.) Sp. Pl. i. 64 (1753), under *Aira;* Richter, Pl. Eur. i. 59 (1890). Type locality European.

Near Mineral King (No. 1495), in Whitney Meadows (No. 1678), and above timberline near Mount Whitney (No. 2063). This is the *Trisetum subspicatum* of most authors.

Spartina gracilis Trin. Agrost. i. 88 (1840). Type locality, "Amer. bor."

At Ash Meadows (No. 364) and at Haway Meadows (No. 1002).

Chloris elegans H. B. K. Nov. Gen. & Sp. i. 165 (1815). Type locality, "inter Mexico et Queretaro."

Dead plants of a *Chloris*, undoubtedly belonging to this species, were seen in the ditch at Furnace Creek Ranch and at the old borax works 3 kilometers farther north.

Phragmites vulgaris (Lam.) Fl. Fr. iii. 615 (1778), under *Arundo;* B. S. P. Cat. Pl. N. Y. 69 (1888). Type locality European.[1]

The reed is of frequent occurrence in the desert marshes. It was found in a cañon on the northeast side of Lone Willow Peak; along Furnace Creek; at Saratoga Springs; at various points in Resting Springs Valley; at Nine Mile, Twelve Mile, Mountain, and Vegas springs, along the road between Pahrump and Vegas valleys; in the Vegas Wash; at Corn Creek, Vegas Valley; in Johnson and Willow Creek cañons, Panamint Mountains; at Hot Springs, Panamint Valley; and at the eastern end of Tehachapi Lake. We did not meet with the plant in the Tulare Plains, and in the desert it was confined to the Lower Sonoran zone.

Sieglingia pulchella (H. B. K.) Nov. Gen. & Sp. i. 155 (1815), under *Triodia;* Kuntze, Rev. Gen. Pl. ii. 789 (1891). Type locality, "in subfrigidis, siccis, apricis regni Mexicani inter Guanaxuato, Mina de Belgrado et Cubilente, alt. 1050 hexap."

Found at several points in the Lower Sonoran zone growing on mountain slopes. Specimens were collected in the southern part of the Funeral Mountains (No. 258) and in the valley of the Virgin River (No. 1906).

Eragrostis purshii Schrad. Linnæa, xii. 451 (1838). Type locality, "America bor[eali]."

Furnace Creek Ranch (No. 244.)

Melica stricta Boland. Proc. Cal. Acad. iii. 4 (1863). Type locality, "Silver City, Nevada Territory."

Near Crystal Spring, Coso Mountains (No. 936.)

Distichlis spicata (L.) Sp. Pl. i. 71 (1753), under *Uniola;* Greene, Bull. Cal. Acad. ii. 415 (1887). Type locality, "in Americæ borealis maritimis."

Nos. 209, 855, 856. This plant, in seizing upon new moist ground not previously occupied by it, sends out long, straight rootstocks, often several meters in length and from these, at intervals of about 10 cm., erect stems arise. A piece of ground thus taken up presents, for the first few years, the striking appearance of being cut into triangles, quadrangles, and similar geometrical figures. These rootstocks subsequently die and decompose between the nodes, and a large number of individuals are thus separated, forming new centers of growth, and soon covering the ground with a dense sod.

Of all the plants that grow on moist soil in the desert, salt grass is the most abundant. It occurred from the most southern point of our route eastward to the Colorado River, northward to Owens River Valley, and westward to the Tulare Plains, in fact, meeting us within the Lower Sonoran zone wherever we went. In some places, as the shore of Owens Lake about Keeler and the farming region near Visalia, it covers many acres of ground, furnishing the natural, but unfortunately very poor, pasturage. Horses eat it with avidity, evidently enjoying the salty taste, but it is so nearly devoid of nutritive matter that they lose flesh constantly.

Poa fendleriana (Steud.) Syn. Pl. Glum. i. 278 (1855), under *Eragrostis;* Vasey, Ill. N. A. Gr. ii. 74 (1893). Type locality, "Mexico."

In the Panamint Mountains (Nos. 507, 782). This is the *Atropis californica* of the Botany of California.

Poa pratensis L. Sp. Pl. i. 67 (1753). Type locality European.

Near Mineral King (No. 1404).

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[1] See L. Sp. Pl. i. 81 (1753), under *Arundo phragmites.*

Festuca microstachys Nutt. Pl. Gamb. 187 (1848). Type locality, "Pueblo de los Angeles, Upper California."
In the Vegas Wash (No. 419), and near Willow Creek, Panamint Mountains (No. 775).

Festuca ovina brevifolia (R. Br.) Chlor. Melv. 289 (1823), as *F. brevifolia;* Wats. Bot. King Surv. 389 (1871). Type locality, "Melville Island."
Above timber-line near Mount Whitney (No. 2065).

Glyceria nervata (Willd.) Sp. Pl. i. 389 (1797), under *Poa;* Trin. Mem. Acad. St. Pet. ser. 6. i. 365 (1831). Type locality, "in America boreali."
Valley of the Kaweah River (No. 1352).

Glyceria pauciflora Presl, Rel. Haenk. i. 257 (1830). Type locality, "in sinu Nootka," Vancouver Island.
Whitney Meadows (No. 1676.)

Bromus orcuttianus Vasey, Bot. Gaz. x. 223 (1885). Type locality, "on the mountains near San Diego," California.
Valley of Kaweah River (No. 1346).

Hordeum jubatum L. Sp. Pl. i. 85 (1753). Type locality, "in Canada."
Valley of the Virgin River (No. 1922).

Hordeum maritimum With. Bot. Arr. i. 172 (1776).
Tehachapi Valley (No. 1130).

Hordeum murinum L. Sp. Pl. i. 85 (1753). Type locality European.
Beginning at the westernmost limits of the desert this plant, squirrel grass, is the commonest and most troublesome weed that exists in intramontane California in cattle ranges and pasture grounds. While we were camped at Fort Tejon our horses tried to feed on it. The barbed awns and glumes became imbedded in the soft parts of their mouths in great quantities, causing inflammation and ugly sores.

Elymus condensatus Presl, Rel. Haenk. i. 265 (1830). Type locality, "ad Monte-Rey, Californiae."
Willow Creek Cañon, Panamint Valley (No. 827).

Elymus elymoides (Raf.) Journ. Phys. lxxxix. 103 (1819), under *Sitanion;* Swezey, Nebr. Fl. Pl. 15 (1891). Type locality, "Missouri."
This tufted rye grass was a valuable forage plant for our half-starved horses while we were in the desert. It grew on rocky slopes in the upper altitudes of the Lower Sonoran zone, extending also into the Upper Sonoran. Although in winter inferior to *Stipa viridula* for forage, in summer it was tender and luxuriant. It was collected at the following points: Willow Creek Cañon, Panamint Mountains (No. 833); Crystal Spring (No. 914); and a few miles east of Tehachapi (No. 1121).

Elymus triticoides Buckley, Proc. Acad. Phila. 1862, 99 (1862). Type locality, "Rocky Mountains."
Resting Springs Valley (No. 281.)

GNETACEÆ.

Ephedra californica Wats. Proc. Amer. Acad. xiv. 300 (1879). Type localities, "San Diego County, California," and "promontory near San Diego and Jamul Valley."
Sterile specimens of a pale green *Ephedra* collected between Victor and Stoddard Wells (No. 159) prove to be, upon comparison with fruiting specimens from an adja-

cent locality sent me by Mrs. Katharine Brandegee, true *E. californica*. It was observed also at the extreme southern end of Panamint Valley, and about the upper spring at Lone Willow Spring. It is undoubtedly an abundant plant in many parts of the Mohave Desert region, but in the field was confounded with *E. nevadensis*.

Ephedra nevadensis Wats. Proc. Amer. Acad. xiv. 298 (1879). Type locality, as taken from No. 1108 of the King Survey, of the female plant, "Pah Ute Mountains; altitude 5,000 feet;" of the male plant, "Carson City; altitude 5,000 feet." Both localities are in Nevada.

The glaucous species of *Ephedra*, *E. nevadensis* and *E. californica*, occur abundantly in the upper part of the *Larrea* belt, and in many cases up to the juniper belt, throughout the desert. Dr. Merriam found one or both of them at many points along his route in Utah and Nevada. In the lower portion of the *Larrea* belt they occur but sparingly.

Ephedra trifurca Torr. in Emory, Rep. 152 (1848). Type locality, "the region between the Del Norte and the Gila."

This species was abundant along the Mohave River at Daggett (No. 152), but was not noted at any other place.

Ephedra viridis sp. nov.

Shrub erect, 0.5 to 1 meter high; branches numerous, erect, bright green, muriculate-roughened; leaf-scales opposite, 3 to 5 mm. long, connate for apparently two-thirds their length when young, in age usually broken off, but the brown thickened base persistent.

Type specimen in the United States National Herbarium, No. 923, Death Valley Expedition; collected June 12, 1892, near Crystal Spring, Coso Mountains, Inyo County, California, by Frederick V. Coville.

It is unfortunate that no specimens of the fruit of this *Ephedra* could be obtained, yet the species is such an important zonal plant that it must necessarily receive a name in this report. It is readily distinguishable in the field from *Ephedra nevadensis*, which has a different range, by its bright green color, and its erect, broom-like branches, that species having a pale glaucous-green color and divergent branches.

No. 387, from the Charleston Mountains, is a specimen collected because of its unusually pale color, resembling in this *E. nevadensis*. No. 112, Xantus, collected near Fort Tejon, California, in 1857–58, and noted by Watson[1] as possibly distinct from *E. nevadensis*, is the same as our plant.

This species is a characteristic plant of the Upper Sonoran zone, usually beginning a little below the juniper belt and extending well up into the piñons. It was first seen on a sheltered north slope of a peak near Copper City Spring, and afterward in the Funeral Mountains on a peak west of Amargosa, in the Charleston, Panamint, Inyo, and Coso mountains, on the eastern slope of the Sierra Nevada near Lone Pine, in Walker Pass on the divide between Kernville and Havilah. Dr. Merriam found it also in the White Mountains of California, in Gold Mountain, Mount Magruder, Pahranagat Mountains and the Highland Range of Nevada, and the Beaverdam Mountains of Utah.

CONIFERÆ.

Pinus aristata Engelm. Trans. St. Louis Acad. ii. 205 (1863). Type locality, "on alpine heights, between 9,200 and 11,800 or 12,000 feet high, on Pike's Peak and the high mountains of the Snowy Range," Colorado.

On the Charleston Mountains (No. 315) the bristle-cone pine is the prevailing tree on south slopes, from the altitude of 3,100 meters to that of at least 3,230 meters. Above the latter height we did not go. On a north slope the tree was seen as low as

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[1] Proc. Amer. Acad. xiv. 299 (1879).

2,970 meters, accompanied by *P. flexilis*, *P. ponderosa*, *Abies concolor*, and *Juniperus occidentalis monosperma*, but higher up in the thickest part of its belt the only other tree was *P. flexilis*. On the Panamint Mountains (No. 537) the tree was seen at the altitudes of from 2,770 meters, on a north slope, to 3,060 meters, and undoubtedly continues to the summit of Telescope Peak, 3,333 meters high. Like all the other trees on the highest part of this range, *P. aristata* grows not in a solid forest, but its individuals widely scattered. In none of the other mountains east of the Sierra Nevada, carefully explored by the expedition, did the bristle-cone pine occur, except, perhaps, the Inyo Range. All the cones that came from these mountains, collected by Mr. Nelson and Mr. Funston, were lost in transportation, but the tree has been reported heretofore from this range.

Pinus attenuata Lemmon, Gard. & For. v. 65 (1892). Type locality,[1] "to the south of Monterey [California], in lat. 36°, near the level of the sea, and growing almost close to the beach."

The narrow-cone pine that has long been known by Gordon's name, *P. tuberculata*. It did not occur properly within the range of expedition's work, but a specimen (No. 1862) was brought by Mr. Nelson from the vicinity of the Yosemite Valley.

Pinus albicaulis Engelm. Trans. St. Louis Acad. ii. 209 (1863). Type locality, "Cascade Mountains, in Oregon."

Specimens of the alpine white-bark pine were collected in the Sierra Nevada, at Kearsage Pass (No. 1860), and on a peak near Mount Whitney (Nos. 2076, 2077). The tree did not occur in any of the desert ranges, and although careful search was made at timber-line in three directions from Mineral King, on the western crest of the Sierra Nevada, and along the northeast side of Whitney Meadows, on the eastern crest, the tree was not found. It is probable that Mount Whitney marks its southern limit in the Sierra Nevada. Mr. Bailey, who collected the specimens from that vicinity, says that the individuals varied in size and form from trees 12 meters in height to low, prostrate shrubs, and that the species constituted the real timber-line tree of the locality, ranging 30 meters higher than *P. balfouriana*, and extending to an altitude about 200 meters below timber-line.

Pinus balfouriana Jeffr. Rep. Oreg. Exped. (1853).

On the high peaks and crests of the Sierra Nevada, about Mineral King (No. 1417), the foxtail pine is the tree that stands next below timber-line. The slopes here are so steep and rocky that solid forests cannot exist, but all about Whitney Meadows and up to timber-line on the adjacent peaks the tree is very abundant, at the lower part of its belt growing freely intermixed with *P. murrayana*. It is rarely reduced at timber-line to a depressed shrub. Specimens were collected at Kearsarge Pass (No. 1861).

Pinus flexilis James, Long Exped. ii. 35 (1823). Type locality, "arid plains subjacent to the Rocky Mountains, and * * * up their sides to the region of perpetual frost."

This, the Rocky Mountain white pine, was found on the Charleston Mountains (No. 316), growing with *P. aristata*, but not so abundant as that species. On the Panamint Mountains (No. 538) it occurred in the same position. Mr. Funston collected specimens on the highest peak of the Grapevine Mountains (No. 1767). In the Sierra Nevada a few specimens were observed along the Hockett Trail, in the valley of Little Cottonwood Creek, on the eastern slope of the Sierra Nevada (No. 1866). It has been reported also from Mount Silliman and from the Inyo Mountains.

Pinus flexilis macrocarpa Engelm. in Rothr. Bot. Wheeler Surv. 258 (1878). Type locality, "on the San Francisco Mountains," Arizona.

This tree is known only in San Francisco Mountain, Arizona (No. 1), where it was collected by the writer on his way to California. It does not properly come within the range of the present report.

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[1] See Journ. Hort. Soc. Lond. iv. 220 (1849).

Pinus jeffreyi Balfour in Jeffr. Rep. Oreg. Exped. (1853).

Throughout the Sierra Nevada, from the vicinity of Fort Tejon to Mount Whitney, the western black pine, at its characteristic altitude, was abundant. It was seen at a distance on the highest peaks from Walker Pass to Tehachapi Valley. On Frazier Mountain (No. 1214), and on Mount Piños, isolated peaks at the confluence of the Coast and Sierran systems, it occurred in abundance. On the western slope of the Sierra Nevada we encountered it in Tejon Cañon (No. 1229), and in the valley of the Kaweah River; while on the headwaters of Kern River, between Farewell Gap and the eastern crest of the Sierra Nevada, we traversed broad forests of it. On the eastern slope of these mountains, along the Hockett Trail, a few trees occurred, and north of Whitney Meadows we descended into its belt again. Specimens were also collected near the head of Owens River (No. 1863), and near Walker Basin (No. 2085). This tree covers a much larger area in the southern Sierra Nevada than does any other timber tree.

Pinus lambertiana Dougl. Trans. Linn. Soc. xv. 500 (1827). Type locality not specifically given. Mr. Douglas says[1] of its range: "This plant covers large districts about 100 miles from the ocean, in latitude 43° North, and extends as far to the South as 40°. It first came under my notice in August 1825, while at the headwaters of the Multnomah River [situated in Oregon, and now called the Willamette]. In October 1826 it was my good fortune to meet with it beyond a range of mountains running in a south-western direction from the Rocky Mountains towards the sea, and terminating at Cape Orford of Vancouver."

We first met with this tree, the great sugar pine, in Tejon Cañon, where it grew in the upper part of the yellow pine belt and in the lower part of the black pine belt. On the East Fork of Kaweah River it ranged from Big Tree Cañon, the beginning of the yellow pines, to a point 100 meters higher than their upper limit. Between Farwell Gap and Whitney Meadows it occurred occasionally among the black pines. The tree is one of magnificent dimensions. One cone was seen which measured 56 cm. in length, and an old woodsman informed me that he had seen a cone 71 cm. long.

Pinus monophylla Torr. & Frem. in Frem. Second Rep. 319 (1845). Type locality, "over the mountains of northern California from longitude 111° to 120°, and through a considerable range of latitude."

The Nevada nut pine is the common piñon of southern Nevada and southeastern California, but was seen in the intramontane region of the latter State only in a few places, such as the western slope of Walker Pass, Tejon Cañon, and the mountain slopes south of Fort Tejon. All along the eastern slope of the Sierra Nevada, as far northward as the expedition went, and southward to the mountains about Antelope Valley, as well as in all the higher peaks eastward to the Colorado River, the tree occurred abundantly. The desert ranges upon which it was observed by the expedition are the White, Inyo, Coso, Argus, Panamint, Grapevine, Charleston, Magruder, Pahroc, Gold, Juniper, Beaverdam, and Virgin mountains, the last six localities on the authority of Dr. Merriam. Specimens were collected in the Charleston Mountains (No. 317) and in the Panamint Mountains (No. 542).

Pinus monticola Lamb. Gen. Pin. iii. 27 (1837).

The cones of this species, the little sugar pine, while usually 11 to 15 cm. long, sometimes reach 26 cm. The tree was found quite abundantly on the mountain slopes about Mineral King (No. 1416), growing with the red fir, above the black pine belt and below that of the foxtail pine. It occurred on the east slope of Farwell Gap and on the divide between Lyon and Trout meadows, but no specimens were seen about Whitney Meadows, its place being taken there apparently by *Pinus murrayana*. Specimens were collected by Mr. Funston near the head of Owens River, on the eastern slope of the Sierra Nevada (No. 1865).

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[1] Trans. Linn. Soc. xv. 497 (1827).

Pinus murrayana Balfour in Jeffr. Rep. Oreg. Exped. (1853).

Along the stream at Mineral King a few trees of the tamarack pine occurred, and more of them on the south slope of the mountain crest back of the White Chief Mine. At a few points along water courses between Farewell Gap and Whitney Meadows it occurred in small quantity, and the forests about the latter place (No. 1626) were made up principally of it. Towards its upper limit the tree grows mixed with *P. balfouriana* or *P. monticola*, occasional specimens having been found not more than 30 meters below timber-line. Its lower limit is very uncertain, its tendency to follow down the moist meadows along the streams often bringing it well into the belt of *P. jeffreyi*. Mr. Funston collected it on the east slope of the Sierra Nevada, near the head of Owens River (No. 1864.)

Pinus ponderosa Loudon, Arbor. & Frut. iv. 2243 (1838)—Dougl. in herb. Type localities, "the north-west coast of North America, on the banks of the Spokan and Flathead rivers, and on the Kettle Falls of the Columbia."

The western yellow pine was observed only on the western slope of the Sierra Nevada, both in Tejon Cañon (No. 1223) and on the East Fork of Kaweah River. In the absence of the Nevada nut pine and gray-leaf pine, this species constitutes the lowest belt of coniferous timber in this part of the Sierra Nevada. In the peaks south of Tejon Cañon, such as Frazier Mountain and Mount Piños, this belt of yellow pine is wanting. Farther northward in the Sierra Nevada there is a continuous belt of it which constitutes an important part of the timber area.

Pinus ponderosa scopulorum Engelm. in Wats. Bot. Cal. ii. 126 (1880). Type locality, "throughout the Rocky Mountains."

The Rocky Mountain yellow pine I found only in the Charleston Mountains (No. 318), where it formed a broad belt between the altitudes of about 2,400 and 3,000 meters. This locality appears to be the western limit of the tree at this latitude. It is the common yellow pine of the Rocky Mountain region. Dr. Merriam has reported it from the Yellow Pine Mountains of Utah; near Sheep Spring, Juniper Mountains, Nevada; and, on the authority of ranchmen, in the Virgin and Highland ranges of the same State.

Pinus sabiniana Lamb. Gen. Pin. iii. 137 (1837)—Dougl. in herb.

This tree, the gray-leaf pine, was found at many points in the southern Sierra Nevada and the adjacent mountains to the south, as follows: on the west slope of Walker Pass; on the foothills between the latter point and Caliente; on the lower mountain slopes around Tehachapi Valley; on the Liebre Mountains, south of Antelope Valley, extending to a point, on the authority of Mr. Palmer, 20 kilometers east of Liebre Ranch house; and among the foothills near Tejon Ranch (No. 1025). The tree did not form a forest at any point, but grew with the nut pines scattered about in open places on chaparral slopes, below the yellow and black pines.

Tsuga pattoniana (Jeffr.) Rep. Oreg. Exped. (1853), under *Abies;* Engelm. Bot. Cal. ii. 121 (1879).

On the eastern slope of the Sierra Nevada, near the headwaters of Owens River (No. 1868), and on the western slope of the same range, at the headwaters of Kings River (No. 2087).

Pseudotsuga macrocarpa (Torr.) Bot. Ives Exped. 28 (1860), as *Abies douglasii macrocarpa;* Lemmon, Third Cal. For. Rep. 134 (1890). Type locality, "mountains near San Felipe," California. The first reference cited contains a nomen nudum.

On the mountain slope back of Fort Tejon (No. 1160); on the lower southern slopes of the San Bernardino Mountains, near Cajon Pass; and on the south side of the Sierra Liebre, near the head of Peru Creek (Merriam).

Abies concolor (Gordon) Pinetum, 155 (1858), under *Picea;*[1] Parry, Amer. Nat. ix. 204 (1875). Type locality, "on the mountains of New Mexico."

East of the Sierra Nevada this tree, the white fir, was found only on the west slope of the Charleston Mountains, Nevada (No. 319), at an altitude of from 2,300 to 3,140 meters, scattered sparingly through the yellow pine belt and extending slightly above it. It undoubtedly occurs throughout these mountains at its characteristic altitude. In the vicinity of Fort Tejon it occurred sparingly on Frazier Mountain among the black pines, and at one spot on the mountain slopes immediately back of the Fort (No. 1188), was a clump in a sheltered north-sloping nook a few hundred meters below the limit of the black pine. On the west slope of the Sierra Nevada, eastward from Tejon Ranch, it occupied the same position in the black pine belt. In the Sierras of Tulare and Inyo counties it was found among the yellow and black pines from Big Tree Cañon to Mineral King; at several points along the Hockett Trail between Farewell Gap and Whitney Meadows, in the black pine belt; and in Fresno County, on the east slope of the Sierra Nevada, about the headwaters of Owens River (No. 1866). Throughout the country in which it ranges the white fir forms at no point by itself a dense forest, but, unless under extraordinary conditions, occurs as a smaller constituent in forests made up of yellow and black pine, *Pinus ponderosa* and *P. jeffreyi*. It may be expected to occur, in this region, wherever such forests do.

Abies magnifica Murr. Proc. Hort. Soc. Lond. iii. 318 (1863). Type locality, "the high unexplored part of the Sierra Nevada, to the eastward of San Francisco."

This magnificant tree, the California red fir, was first met with near Mineral King at an altitude of about 2,700 meters, and was found in considerable abundance in the high Sierra Nevada, about the headwaters of Kings River (Mr. Palmer), Kaweah River, and the North Fork of Kern River. Specimens were collected by Mr. Funston on the eastern slope of the Sierra Nevada, about the headwaters of Owens River (No. 1867).

Sequoia gigantea (Lindl.) Gard. Chron. 1853, 823 (1853), under *Wellingtonia;* Dcne. Bull. Soc. Bot. Fr. i. 70 (1854). Type locality,[2] "on the elevated slopes of the Sierra Nevada, near the head waters of the Stanislau and San Antonio rivers, in lat. 38° N., long. 120° 10′ W., at an elevation of 5,000 feet from the level of the sea."

Various parties of the expedition passed through different groves of this tree, the giant sequoia, on Merced, Kings, and Kaweah rivers. The location and extent of these groves has already been well described and will be omitted here. The tree occupies isolated areas in the yellow pine belt, and specimens were collected in the Mariposa grove (No. 1857).

At a sawmill a few kilometers below Mineral King, on the Kaweah River, the sequoias were being worked into lumber and a rapid destruction of the forest was going on.

Libocedrus decurrens Torr. Pl. Frem. 7 (1853). Type locality, "upper waters of the Sacramento, particularly from lat. 38° 40′ to about 41° N. lat."

A few California post cedar trees were seen in Tejon Cañon, near its mouth (No. 1218); and others in the valley of the Kaweah Kiver (No. 1313), below the yellow pine belt.

Juniperus californica Carr. Rev. Hort. 1854, 353 (1854).

This, the type form of California juniper, is characteristic of the coast mountains of California from San Francisco southward. Like many other coast species it follows the mountains inland to their junction with the Sierra Nevada and then continues eastward along the margin of the desert in the San Bernardino Mountains.

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[1] Engelmann's name, *Pinus concolor*, was an herbarium name merely, and Lindley and Gordon's name, *Abies concolor,* was a nomen nudum. See Sudworth, Bull. Torr. Club, xx. 42 (1893).

[2] Gard. Chron. (1853) 819.

It grew abundantly on the northern footslopes of the San Bernardino Mountains, between Cajon Pass and Hesperia (No. 52); and occasional specimens were seen on the south slope of the pass as far down as Cajon station on the Southern California Railway (No. 125). It was seen also at Soledad Pass; at Liebre Ranch, in the western end of the Mohave Desert; on the hillsides back of Fort Tejon; in Tehachapi Cañon; at several points on the mountain slopes between Kernville and Walker Basin; and on the slopes of Walker Pass. At the stations on the west slope of the Sierra Nevada the tree occurred in scarcely sufficient abundance to determine its zonal limits. It was found to some extent in both the chaparral belt and that of Douglas's oak. Wherever it occurred on the eastern slope of the Cordilleran system it occupied the Upper Sonoran zone.

Juniperus californica utahensis Engelm. Trans. St. Louis Acad. iii. 588 (1877) Type locality, "all over the southern parts of Utah and into Arizona and Nevada."

This variety differs morphologically from the type form in scarcely anything except the smaller size of its fruit and the fewer number of its seeds. In its range it is confined entirely to the Great Basin region. It is a characteristic tree of the Upper Sonoran zone, and, since it extends a little lower than *Pinus monophylla*, grows at a lower altitude on the desert mountains than any other coniferous tree. It occurs in the Charleston Mountains (No. 301), beginning at altitudes on the western slope, of 1,585 and 1,450 meters and extending far into the nut pines; in the Panamint Mountains (Nos. 645, 656, 658), beginning at altitudes of 1,740, 1,645, 1,770, and 1,800 meters; and on the east slope of the Inyo Mountains, at 1,815 meters. Specimens were collected by Mr. Palmer in the Coso Mountains (No. 882), and Mr. Funston reported it from the Grapevine Mountains. Dr. Merriam found it also in the White Mountains of California; the Pahranagat, Pahroc, Hyko, Highland, and Juniper (No. 1992) mountains of Nevada; and the Beaverdam Mountains of Utah. In the western part of its range, as in the Coso and Inyo mountains and that part of the Panamint Mountains near Jackass Spring, the tree did not occur abundantly and on the eastern slope of the Sierra Nevada and on the Argus Mountains it was not found at all.

Juniperus occidentalis Hook. Fl. Bor. Amer. ii. 166 (1838). Type locality, "N. W. America; banks of the waters in the Rocky Mountains."

This tree, the western juniper, occurred sparingly in the higher Sierra Nevada, near Mineral King, and between Farewell Gap and the north fork of Kern Kiver. Mr. Palmer collected it at Horse Corral Meadows (No. 2086), on the headwaters of Kings River. In the Transition zone of the Panamint Mountains (Nos. 536, 539) were collected specimens of a tree which is doubtfully referred here. It may be the variety *monosperma*.

Juniperus occidentalis monosperma Engelm. Trans. St. Louis Acad. iii. 590 (1877). Type locality, "from the Pike's Peak region of Colorado, through West Texas and New Mexico to Arizona and California."

Specimens were collected in the southern part of the San Francisco Mountain, Arizona (No. 2), and in the Charleston Mountains, Nevada (No. 322). It was also reported by Mr. Funston from Grapevine Peak, Nevada. The tree grows in the Transition zone.

Juniperus pachyphlœa Torr. Pac. R. Rep. iv. 142 (1857). Type locality, "on the Zuñi Mountains, Western New Mexico."

San Francisco Mountain, Arizona (No. 3).

Tumion californicum (Torr.) N. Y. Journ. Pharm. iii. 51 (1854), under *Torreya;* Greene, Pittonia, ii. 195 (1891). Type locality, "upper part of the Yuba and Feather rivers, on the western slope of the Sierra Nevada, of California."

This tree, the California false nutmeg, was found only in the valley of the Kaweah River, at a few points between Kane Flat and Big Tree Cañon (No. 1752), growing at and below the lower limit of the yellow pine belt.

ISOETACEÆ.[1]

Isoetes bolanderi Engelm. Amer. Nat. viii. 214 (1874). Type localities, "in ponds and shallow lakes on the Sierra Nevada of California, at an altitude of 5,000–10,000 feet (Tuolumne, Mount Dana, Mono-trail, Cisco, Mary's Lake) and on the Rocky Mountains (Yellowstone Lake, 7,400 feet alt.)."

In the high Sierra Nevada (Nos. 1643, 1650, 1691, 1722). [No. 1643 is referred here doubtfully, with the following distinctive characterization: leaves flaccid, 20 to 30 cm. high; sporangia immature, but macrospores in old, muddy bases of plants, differing only from *I. bolanderi* in being more smooth; microspores also nearly smooth. No. 1691 is a small, immature form, but it probably belongs here.—L. M. U.]

SELAGINELLACEÆ.

Selaginella rupestris L. Sp. Pl. ii. 1101 (1753), under *Lycopodium;* Spring in Mart. Fl. Bras. i. pt. ii. 118 (1840). Type locality, "in Virginia, Canada, Siberia."

Near San Bernardino (No. 101), in Surprise Cañon, Panamint Mountains (No. 628), and above timber-line on Mount Whitney (No. 2071). [These specimens represent two of the many forms of this plant, No. 101 more slender, upright, and ascending, and the others compact, stout, and closely creeping.—L. M. U.]

EQUISETACEÆ.

Equisetum lævigatum A. Br. Amer. Journ. Sci. xlvi. 87 (1843). Type locality, "on poor, clayey soil, with *Andropogon* and other coarse grasses, at the foot of the rocky Mississippi hills, on the banks of the river, below St. Louis."

Mill Creek Cañon, Panamint Mountains (No. 808).

Equisetum robustum A. Br. Amer. Journ. Sci. xlvi. 88 (1843). Type localities, "islands of the Mississippi in Louisiana," "banks of Red River," "banks of the Wabash and Ohio, and the Mississippi, near St. Louis; also on lakes and smaller streams in that region," "and banks of the Missouri up to Eau-qui-coule River."

Near San Bernardino (No. 13) and in the Panamint Mountains (No. 530). [The specimens of No. 13 are sterile, and are referred here with some doubt.—L. M. U.]

Equisetum variegatum Weber & Mohr, Deutsch. Crypt. Gewäch. 447 (1807). Type locality European.

Near San Bernardino (No. 27), in the Panamint Mountains (No. 531), in Panamint Valley (No. 689), near Kernville (No. 1042), and near Three Rivers (No. 1297). [Of the fertile specimens, No. 27 differs somewhat from the typical form of the species, being larger, smoother, and with the spike scarcely cuspidate. Nos. 531 and 689 are sterile, and the latter approaches *E. lævigatum* in smoothness of stem.—L. M. U.]

OPHIOGLOSSACEÆ.

Botrychium simplex Hitchcock, Amer. Journ. Sci. vi. 103 (1823). Type locality, "in Conway, Massachusetts."

In the Sierra Nevada (Nos. 1632, 1703).

SALVINIACEÆ.

Azolla caroliniana Willd. Sp. Pl. v. 541 (1810). Type locality, "in aquis Carolinæ."

This minute aquatic occurred in the San Bernardino Valley (No. 24); in the Mohave

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[1] The plants from Isoetaceæ to Marsiliaceæ inclusive have been determined by Professor L. M. Underwood.

River at Daggett; between Lone Pine and Olancha, Owens Valley; at several points between Kernville and Tehachapi; near Visalia; and at Three Rivers (No. 2075). The plant is of rare occurrence in the desert, but common in intramontane California.

MARSILIACEÆ.

Marsilia vestita Hook. & Grev. Ic. Fil. t. 159 (1831). Type locality, "ad flumen Columbiam, ora occidentali Americæ septentrionalis."

Near Visalia (No. 1275).

POLYPODIACEÆ.

By Daniel C. Eaton.

Gymnogramme triangularis Kaulf. Enum. Fil. 73 (1824). Type locality not given other than "California;" range from British Columbia to Lower California and Guadalupe Island; also accredited to Ecuador.

On the south slope of the San Bernardino Mountains (No. 43), and in the Panamint Mountains (No. 610). In the specimens marked 610, the yellow powder is very scanty and in some of them it is lacking altogether. These specimens have the appearance of having grown in the shade.

Nothochlæna parryi Eaton, Amer. Nat. ix. 351 (1875). Type locality, St. George, Utah; range from southern Utah to the neighborhood of San Bernardino, California.

Near Ash Meadows (No. 367) and in the Panamint Mountains (Nos. 502, 650).

Cheilanthes viscida Davenp. Bull. Torr. Club, iv. 191 (1877). Type locality, White Water Cañon in the Colorado Desert, Arizona; range extending to Downieville Buttes and San Gregorio Pass.

Surprise Cañon, Panamint Mountains (No. 594). The more abundant specimens now collected show no departure from the type, save that some of them are, perhaps, a little taller.

Cheilanthes myriophylla Desv. Berlin. Mag. v. 328 (1811). Type locality, South America; range from Peru along the mountains northward to California, Arizona, and New Mexico.

No. 593, well-developed specimens; Nos. 540, 643, 651, a condensed form, with short, stalked fronds, the scales mostly cinnamon-brown; Nos. 188, 777, a form with long-stalked fronds and large, white, imbricated scales. No. 188 was collected in the Slate Range, the others in various parts of the Panamint Mountains.

I find it impossible to distinguish between *C. myriophylla* and *C. fendleri*. Specimens which I had at one time called *C. fendleri* I afterwards referred to *C. myriophylla*, and Mr. Davenport again placed in *C. fendleri*. Even Mr. Faxon's carefully drawn figures in the Ferns of North America (t. lxxix) do not show the differences which I thought I could discern when that book was written, and I am persuaded that *C. myriophylla* is a fern which presents a multitude of varying forms, connected by all degrees of intermediate conditions, which it is not worth while to try to separate, even into named varieties.

Pellæa breweri Eaton, Proc. Amer. Acad. vi. 555 (1865). Type locality, among rocks at Sonora Pass and Ebbetts Pass, Sierra Nevada, California; range extending to the Belt Mountains of Montana, and to New Mexico at Loma, on the Rio Grande.

No. 2028, from Telescope Peak, Panamint Mountains, a few imperfectly developed young fronds; No. 1501, from the vicinity of Mineral King, Sierra Nevada, good, typical specimens.

Pellæa andromedæfolia (Kaulf.) Enum. Fil. 188 (1824), under *Pteris;* Fee, Gen. Fil. 129 (1850-52). Type locality, San Francisco; range mostly near the coast. Also in Chile, and said to occur in South Africa.

Near Fort Tejon (No. 1149).

Pellæa ornithopus Hook. Sp. Fil. ii. 143 (1858). Type locality, "California;" range, from Shasta County to San Diego, and extending into Arizona.
In the valley of the Kaweah River (No. 1349).

Pellæa densa (Brack.) Bot. Wilkes Exped. xvi. 120 (1854), under *Onychium;* Hook. Sp. Fil. ii. 150 (1858). Type locality, on the banks of Rogue River, Oregon; range, Sierras of California, Oregon, Idaho, Wyoming, British Columbia, and on Mount Albert, Gaspé, Quebec.
Near Mineral King, Sierra Nevada (No. 1454).

Pellæa bridgesii Hook. Sp. Fil. ii. 238 (1858). Type locality, "mountains, interior of California;" range, Sierras of California, also dwarf specimens collected near Helena, Montana.
Near Mineral King (No. 1418).

Cryptogramma acrostichoides R. Br. in Richards. Bot. App. 767 (1823). Type locality, British America between N. Lat. 56° and 60°, first found by Menzies at Nootka Sound; range, from Arctic America to Colorado and California.
In the high Sierra Nevada, near Mineral King (No. 1502).

Adiantum emarginatum Hook. in Eaton, Ferns N. A. i. 285 (1879). Type locality not known, said to be Mauritius, but undoubtedly California; range, Oregon and California.
Along an irrigating ditch at Vegas Ranch, Nevada (No. 2154), and about a spring in the Panamint Mountains (No. 621). The reasons for adopting for this very distinct species the name *emarginatum* are given in the Ferns of North America. In the Species Filicum Hooker gives no good character for the fern, but his figure is excellent for the Californian plant, and resembles nothing known from the Indian Ocean. I am glad to follow Keyserling in adopting Hooker's name.

Adiantum pedatum L. Sp. Pl. ii. 1095 (1753). Type locality, Canada and Virginia; range, from New Brunswick to British Columbia, southward to Alabama and California; also in Alaska, Japan, Mantchooria, and the Himalayas.
In the valley of the Kaweah River (No. 1351).

Woodwardia radicans (L.) Mant. Pl. i. 307 (1767), under *Blechnum;* Smith, Mem. Acad. Turin, v. 412 (1790). Type locality, Madeira and the Canary Islands; range, from Madiera to Kongo, Abyssinia, northern India, China, and Australia; California and Mexico to Guatemala, and probably Peru.
In the valley of the Kaweah River (No. 1343). A single frond of the American form of the species, in which, as is well known, the chaffy proliferous bud near the apex of the frond has not yet been noticed.

Phegopteris alpestris (Swartz) Syn. Fil. 421 (1806), under *Aspidium;* Mett. Fil. Hort. Lips. 83 (1856). Swartz quotes the name *A. alpestre* from "Hoppe, Taschenb., 1805." Type locality, "Carinthia, Helvetia;" range, mountains of central and northern Europe and Asia Minor, and in America along the Sierras of California to the mountains of British Columbia.
In the high Sierra Nevada, near Mineral King (No. 1557).

Aspidium rigidum argutum (Kaulf.) Enum. Fil. 242 (1824), as *Aspidium argutum;* Eaton, Bot. Wheeler Surv. 333 (1878.) Type locality, "California," probably near San Francisco; range of this variety, from northwestern Mexico throughout California and Oregon to Washington and British Columbia, where it passes into forms more like the European *A. rigidum* Swartz
In Tejon Cañon (No. 1219).

Cystopteris fragilis (L.) Sp. Pl. ii. 1091 (1753), under *Polypodium;* Bernh. in Schrad. Neu. Journ. Bot. i. pt. ii. 27 (1806). Type locality, "in the hills of the colder parts of Europe;" range, nearly the whole habitable world.

Valley of the Kaweah River (No. 1348), and in Big Cottonwood Meadows (No. 2127).

BRYACEÆ.[1]

Tortula inermis (Muell.) Mont.
In a cañon of the Funeral mountains, west of Amargosa (No. 335).

Tortula membranifolia Hook.
With the last (No.2161).

Tortula ruralis (L.) Ehrh.
Surprise Cañon, Panamint Mountains (No. 661).

Grimmia plagiopodia pilifera Lesq. & James.
In a cañon of the Funeral Mountains, west of Amargosa (No. 336).

Orthotrichum cupulatum Hoffm.
On the southern foothills of the San Francisco Mountain, Arizona (No. 10). The specimens are not in condition for positive identification.

Mr. Bailey collected on the mountains near Mount Whitney, at an altitude of 600 meters above timber-line, and 4,300 meters above sea level, an *Orthotrichum* (Nos. 2078, 2079), which unfortunately is not identifiable. It is interesting as the plant collected at the highest point by the expedition.

Leersia trachymitra (Ripart) Holzinger nom. nov.
Surprise Cañon, Panamint Mountains (No. 660). [Husnot[2] reduces this plant to a variety of *L. extinctoria*. Watson's No. 1397*a*, from Utah, and No. 1398, from Nevada, which are the same as the plant of Mr. Coville's collection, are referred to *L. extinctoria*, one of them to variety *obtusa*. But this species has only the tip of the calyptra papillose, a character which is constant in a series of several specimens, while the plants above referred to have the calyptra strongly papillose throughout. Their leaves are beset on both surfaces with characteristic long bifurcate papillæ. The lower part of the costa beneath bears similar papillæ, while its upper part is coarsely toothed.—J. M. H.]

Funaria hygrometrica (L.) Sibth.
On the banks of a stream flowing from Hall Cañon, Panamint Valley (No. 671).

Philonotis fontana Brid.
By a spring near the summit of Frazier Mountain (No. 2165).

Leptobryum pyriforme (L.) Wils.
Along a stream on the northwest slope of Frazier Mountain (No. 1210).

Bryum alpinum L.
From the capsule this might be taken for a form of *B. cæspiticium*, but the short points of the leaves, the square cells at leaf-base, and the very light-colored peristome forbid it. These are all characters of *B. alpinum*. It is true, the operculate capsules are of the form and length of *B. cæspiticium;* but the deoperculate capsules are widest at mouth, the rest of the capsule shrinking and coming to a point at its junction with the seta, as in *B. alpinum*; leaf cells little larger and more thin-walled, less opaque.

Big Tree Cañon, valley of the Kaweah River (No. 1358)

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[1] The Musci have been determined by Mr. J. M. Holzinger.

[2] Musc. Gal. 197.

Bryum bimum Schreb.
On the northwest slope of Frazier Mountain (No. 1211.)

Bryum cæspiticium L.
Near Mineral King, Sierra Nevada (No. 2162).

Polytrichum piliferum Schreb.
Near Farewell Gap, in the high Sierra Nevada (No. 2159).

Hypnum aduncum hamatum Br. & Sch.
Near Whitney Meadows, in the Sierra Nevada (No. 2166).

Hypnum aduncum kneiffii Schimp.
In a pond northwest of Whitney Meadows (No. 1640).

Hypnum ochraceum Wils.
Near Whitney Meadows (No. 1637).

Hypnum serrulatum Hedw.
In the valley of the Kaweah River (No. 2163).

JUNGERMANNIACEÆ.[1]

Jungermannia mülleri danaensis Underwood.
Near Mineral King, in the high Sierra Nevada (No. 1573).

MARCHANTIACEÆ.

Sauteria limbata Aust.
Near Mineral King (No. 1511).

Fimbriaria bolanderi Aust.
Near Mineral King (Nos. 1420, 1510).

Fimbriaria californica Hampe.
Valley of the Kaweah River (No. 1304).

Aitonia erythrosperma (Aust.) Underwood.
Near Mineral King (No. 1528).

Targionia hypophylla L.
Near Cottonwood Springs, Vegas Valley (No. 393), and in Surprise Cañon, Panamint Mountains (No. 619).

RICCIACEÆ.

Riccia californica Aust.
Near Three Rivers (No. 1295). The specimens are too fragmentary to admit of positive determination, but they appear to belong here.

Riccia fluitans L.
In the spring at Vegas Ranch, Nevada (No. 400).

Riccia glauca L.
Near Mineral King (No. 1509).

Sphærocarpus terrestris californicus (Aust.) Underwood.
Near Three Rivers (No. 1294).

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[1] The Hepaticæ have been determined by Professor L. M. Underwood.

CHARACEÆ.[1]

Chara altaica A. Br.
In Castac Lake, Cañada de las Uvas (No. 1146).

Chara fœtida A. Br.
The water in which this plant occurred was always sufficiently fresh to be quite palatable. It was found in Furnace Creek (No. 234); in Cottonwood Springs, Vegas Valley (No. 392); in ditches at Ash Meadows; and in a watering trough at Cameron, Tehachapi Cañon. All these stations are within the limits of the Lower Sonoran zone.

UREDINACEÆ.[2]

Uromyces astragali (Opiz.) Sacc. II.
In the Charleston Mountains, Nevada (No. 374), on *Astragalus triflorus.*

Uromyces bicolor Ellis sp. nov.
Spermogonia minute, scattered among the æcidia, which are scattered thickly but irregularly over both sides of the tips of the leaves, about 0.33 mm. in diameter, hemispheric-prominent and closed at first, then open, but slightly contracted above, urceolate, with the margin sublacerate, becoming subentire; spores angular or subglobose, 22–30 μ in the longer diameter, smooth; uredospores elliptical or subglobose, smooth, pale, 22–30 by 20–25 μ, with a thick epispore and coarse granular contents, in pale, yellowish, elliptical sori closely embraced and partly covered by the thin epidermis, about 1 mm. long by 0.33 to 0.50 mm. wide; teleutospores varying considerably in shape, mostly obovate or clavate, narrowed from the middle down to the subacute base, moderately thickened at the apex, which is obtusely pointed or regularly rounded, 20–28 by 15–20 μ, loosely clustered in small (1–2 mm.), thin, nearly black, suborbicular or irregularly shaped, naked, amphigenous sori which present about the same general appearance as the sori of *Ravenelia*, never being covered by the epidermis, but growing on small, yellowish, slightly thickened spots scattered over the leaf. The tips of the leaves occupied by the æcidia are yellow and dead, but scarcely thickened.

On leaves of *Allium validum*, near Mineral King, Sierra Nevada, Tulare County, California, August 6, 1891; Death Valley Expedition, No. 1499.

Uromyces eriogoni Ell. & Hark.
Valley of the South Fork of Kern River (No. 2156), on *Eriogonum nudum pauciflorum.*

Uromyces glycyrrhizæ (Rabenh.) Magn. II.
Near Lone Pine (No. 957), on *Glycyrrhiza lepidota.*

Uromyces œnotheræ Burr. II.
In Surprise Cañon, Panamint Mountains (No. 2083), on *Œnothera cardiophylla.*

Uromyces striatus Schrot.
Near Crystal Spring, Coso Mountains (No. 917), on *Euphorbia albomarginata.*

Melampsora farinosa Pers. II.
Near Mineral King (No. 1481), on *Salix.*

Puccinia giliæ Hark.
In the valley of Kaweah River (No. 2144), on *Gilia virgata floribunda.*

Puccinia menthæ Pers. II.
Near Visalia (No. 2149), on *Mentha canadensis.*

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[1] Determined by Dr. T. F. Allen.

[2] The fungi have been determined by Mr. J. B. Ellis and Miss May Varney.

Æcidium gayophyti Vizé.

Black Cañon, White Mountains (No. 2084), on *Gayophytum ramosissimum*.

USTILAGINACEÆ.

Ustilago minima Arthur.

San Francisco Mountain (No. 9), on a grass.

SPHÆRIOIDACEÆ.

Phleospora bigeloviæ Ellis sp. nov.

Perithecia erumpent, gregarious, black, irregular in shape and irregularly ruptured above, exposing the mass of vermiform-cylindrical, more or less curved or bent sporules; these 20–28 by 4–5 μ in size, hyaline, granular, nucleate, on short basidia. The character of the perithecia is about the same as in *Micropera*, but the foliicolous growth, as well as the nature of the sporules, indicates a closer relationship with *Phleospora*.

On leaves of *Bigelovia*, near Tejon Pass, Kern County, California, July 12, 1891; Death Valley Expedition, No. 2108.

MELANCONIACEÆ.

Septoglœum fraxini Hark.

Valley of Kaweah River (No. 2147), on *Fraxinus oregana*.

BATRACHOSPERMACEÆ.

Batrachospermum boryanum Sirodot.

Cottonwood Springs, Vegas Valley, Nevada (No. 389). Determined by W. G. Farlow. This identification is based on the presumptive evidence that the specimens are those of a diœcious species. Plenty of antheridia were found, but no trichogynes nor spores.

CONFERVACEÆ.

Cladophora.

Owens Lake (No. 858). Dr. Farlow refers this remarkable alga to *Cladophora*, but from lack of sufficient material is unwilling to dispose of it more definitely.

Owens Lake is an inland, alkaline body of water 24 kilometers long by 14 kilometers wide, lying at the eastern base of the Sierra Nevada, in the desert, at an altitude of 1,087 meters. It is fed by several fresh-water streams, one of them, Owens River, draining a large area of mountainous country to the northward. The lake has no outlet, but loses its surplus water by evaporation. The water is intensely alkaline; so much so that the lake contains no fish and none of the aquatic plants found in fresh-water lakes and in most of the desert pools of ordinary alkalinity. Even the fringe of tule so characteristic of the desert marshes is found about Owens Lake only where the shore is moistened by a stream or spring of fresh water.

The following analysis of 100 liters of water from Owens Lake show its principal chemical constituents.[1]

	Grams.
Potassium sulphate	644.87
Sodium sulphate	929.07
Sodium carbonate	2,440.80
Sodium chloride	2,328.30
Silicic acid	17.21
	6,360.25

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[1] Loew in Annual Report of the Wheeler Survey for 1876, p. 190 (1876.)

The *Cladophora* occurs in simple spherical masses varying in size from minute bodies to balls a centimeter in diameter. These balls float in great abundance upon the water, on the leeward shore of the lake often entirely covering the surface. Soon after attaining their full size the balls disintegrate into an amorphous, slimy mass. The plant is of interest as exhibiting the possibility of the existence of plant life in water so intensely alkaline.

VOLVOCACEÆ.

Chlamydococcus nivalis A. Br.

The so-called red snow of alpine regions was seen frequently about Farwell Gap and at other points in the vicinity of timber-line in the high Sierra Nevada. The moist snow presents in spots a beautiful pink color, in clear contrast with the white of other portions. When examined in the hand the snow looks precisely as if it had been stained with a pale-red fluid, and does not show any red corpuscles. No microscopic examination of the minute alga could be made.

ZYGNEMACEÆ.

Spirogyra.

Plants of this genus, but not in condition for specific identification, were seen at a few points in the desert, such as Furnace Creek and some of the springs in Owens Valley.

NOSTOCACEÆ.

Nostoc verrucosum Vaucher.

Cottonwood Springs, Vegas Valley, Nevada (No. 391). Determined by W. G. Farlow.

SUMMARY OF CATALOGUE.

The number of new species and varieties brought to light by the expedition up to the present time is 42, a few other apparently undescribed plants, not mentioned in the catalogue, having been laid aside for future consideration. The names of the new plants are printed in heavy-faced type in the index of the report. Two new genera have been erected, *Orochænactis* and *Phyllogonum*, the former based on a species heretofore referred to *Chænactis*, the latter on a newly discovered plant. The whole number of species and varieties enumerated in this catalogue is 1,261. It should be understood, however, that the desert region of California, of which Death Valley forms a part, does not contain all these twelve hundred species. More than one-half of them were collected either in the Sierra Nevada and its southern continuations, or in the Tulare Plains, areas with vegetation almost wholly different from that of the desert region. A list of the plants found in the Lower Sonoran zone of the desert is given on pages 39 to 41.

CATALOGUE OF SPECIMENS.

[All the specimens enumerated in this catalogue were collected, unless a statement to the contrary is made, either by Frederick V. Coville, or by Frederick Funston, or by both conjointly.]

No.	Name.	Date.	Locality.	Remarks.	Altitude.
		1890.			*Meters.*
1	Pinus flexilis macrocarpa Engelm	Dec. 23	San Francisco Mountain, Arizona	On the south slope of the foothills, about 3 kilometers northeast from Flagstaff.	2,800
2	Juniperus occidentalis monosperma Engelm	do	do	do	2,300
3	Juniperus pachyphlœa Torr	do	do	do	2,200
4	Quercus	do	do	do	2,200
5	Quercus gambelii Nutt	do	do	do	2,200
6	Agave	do	do	do	2,200
7	Garrya veatchii flavescens (Wats.) Coult. & Evans.	do	do	do	2,200
8	Garrya wrightii Torr	do	do	do	2,200
9	Ustilago minima Arthur	do	do	do	2,300
10	Orthotrichum cupulatum Hoffm	do	do	do	2,150
11	Franseria acanthicarpa (Hook.) Coville	Dec. 27	Near San Bernardino, California	Wash of Lytle Creek	275
12	Juncus balticus Willd	do	do	do	275
13	Equisetum robustum A. Br	do	do	do	275
14	Juncus rugulosus Engelm	do	do	do	275
15	Eleocharis montana (H. B. K.) R. & S	do	do	do	275
16	Helianthemum scoparium Nutt	do	do	do	275
17	Rumex hymenosepalus Torr	do	do	do	275
18	Lepidospartum squamatum Gray	do	do	do	275
19		do	do	Along Lytle Creek, on *Aplopappus pinifolius*	275
20	Eleocharis capitata (Willd.) R. Br	Dec. 28	do	About 1.5 kilometers east of the city	275
21	Juncus balticus Willd	do	do	do	275
22	Heterotheca grandiflora Nutt	do	do	do	275
23	Cotula coronopifolia L	do	do	do	275
24	Azolla caroliniana Willd	do	do	do	275
25	Ceratophyllum demersum L	do	do	do	275
26	Cyperus diandrus capitatus Britton	do	do	do	275
27	Equisetum variegatum Weber & Mohr	do	do	do	275
28	Opuntia engelmanni occidentalis (Engelm. & Bigel.) Engelm.	Dec. 27	do	Along Lytle Creek	275
29	Opuntia bernardina Parish	do	do	do	275
30	Lotus glaber (Vogel) Greene	Dec. 29	do	Between San Bernardino and Redlands	300
31	Œnothera bistorta Nutt	do	do	do	300
32	Croton californicus Müll. Arg	do	do	do	300
33	Euphorbia serpillifolia Pers	do	do	do	300
34	Erodium cicutarium (L.) Ait	do	do	do	300
35	Amsinckia spectabilis Fisch. & Mey	do	do	do	300
36	Tropidocarpum gracile Hook	do	do	do	300
37	Eriogonum fasciculatum Benth	do	do	do	300
38	Ptiloria exigua (Nutt) Greene	do	do	do	300

39	**Croton californicus Müll. Arg**	1891. Jan. 2	South slope of the San Bernardino Mountains, California.	Near Lawrence's ranch, on the road from San Bernardino to Cajon Pass.	650
40	Eriophyllum confertiflorum (DC.) Gray	do	do	On the road from San Bernardino to Cajon Pass.	
41	Bikukulla chrysantha (Hook. & Arn.) Coville	do	do	do	
42	Gilia	do	do	do	
43	Gymnogramme triangularis Kaulf	do	do	do	
44	Garrya veatchii Kellogg	do	do	do	
45	Prunus ilicifolia (Nutt.) Walp	do	do	do	
46	Salazaria mexicana Torr	Jan. 4	Near Hesperia, San Bernardino County, California.		975
47	Grayia spinosa (Hook.) Moq	do	do		975
48	Aplopappus monactis Gray	do	do		975
49	Erodium cicutarium (L.) Ait	do	do		975
50	Larrea tridentata (DC.) Coville	do	do		975
51	Opuntia basilaris Engelm. & Bigel	do	do		975
52	Juniperus californica Carr	do	do		975
53	Aplopappus monactis Gray	do	do		975
54	Salvia carnosa Dougl	do	do		975
55 to 100				Numbers blank	
101	Selaginella rupestris (L.) Spring	Jan. 3	Near San Bernardino, California	On the road to Cajon Pass	400
102	Cuscuta californica Choisy	do	do	On *Adenostoma fasciculatum*	400
103	Adenostoma fasciculatum Hook. & Arn	do	do	Between San Bernardino and Martin's ranch	400
104	Ramona polystachya (Benth) Greene	do	do	do	400
105	Pentstemon antirrhinoides Benth	do	do	do	400
106	Cercocarpus parvifolius Nutt	do	do	do	400
107	Eriodictyon californicum Hook. & Arn. Greene	do	do	do	400
108	Baccharis viminea DC	do	do	do	400
109	Ceanothus cuneatus (Hook.) Nutt	do	do	do	400
110	Rhus ovata Wats	do	do	do	400
111	Artemisia californica Less	do	do	do	400
112	Pæonia californica Nutt	do	do	do	400
113	Ceanothus divaricatus Nutt	do	do	do	400
114	Prunus ilicifolia (Nutt.) Walp	do	do	do	400
115	Quercus dumosa Nutt	Jan. 4	South slope of the San Bernardino Mountains, California.	Along the road between Martin's ranch and Crowder's ranch, south of Cajon Pass.	850
116	Quercus dumosa Nutt	do	do	do	850
117	Heteromeles arbutifolia Ait. f	do	do	do	850
118	Ceanothus crassifolius Torr	do	do	do	850
119	Arctostaphylos glauca Lindl	do	do	do	850
120	Pæonia californica Nutt	do	do	do	850
121	Pentstemon centranthifolius Benth	do	do	do	
122	Senecio douglasii DC	do	do	do	
123	Aplopappus pinifolius Gray	do	do	do	
124	Artemisia californica Less	do	do	do	
125	Juniperus californica Carr	do	do	do	
126	Rhamnus californica Esch	do	do	do	
127	Rhamnus crocea Nutt	do	do	do	
128	Platanus racemosa Nutt	do	do	do	

Catalogue of specimens—Continued.

No.	Name.	Date.	Locality.	Remarks.	Altitude.
					Meters.
129	Salix lasiolepis Benth	1891. Jan. 4	South slope of the San Bernardino Mountains, California.	Along the road between Martin's ranch and Crowder's ranch, south of Cajon Pass.	
130	Phoradendron bolleanum (Seem.) Eichler	do	do	On *Juniperus californica* along the road between Martin's ranch and Crowder's ranch.	
131	Opuntia ramosissima Engelm	Jan. 5	Between Hesperia and Victor, San Bernardino County, California.	About 15 kilometers from Victor	
132	Opuntia echinocarpa Engelm. & Bigel	do	do	About 3 kilometers from Victor	
133	Cassia armata Wats	Jan. 7	Between Stoddard Wells and Daggett, San Bernardino County, California.		
134	Atriplex confertifolia (Torr. & Frem.) Wats	do	do		
135	Petalonyx thurberi Gray	do	do		
136	Lepidium fremontii Wats	do	do		
137	Atriplex hymenelytra (Torr.) Wats	do	do		
138	Opuntia basilaris Engelm. & Bigel	Jan. 5	At Hesperia, San Bernardino County, California.		
139	Yucca macrocarpa (Torr.) Coville	Jan. 6	Near Victor, San Bernardino County, California.	About 16 kilometers north from Victor, on the road to Stoddard Wells.	
140 to 149				Numbers blank	
150	Oxytheca perfoliata Torr. & Gr	Jan. 6	Between Victor and Stoddard Wells, San Bernardino County, California.		
151	Thamnosma montana Torr. & Frem	do	do		
152	Ephedra trifurca Torr	Jan. 8	Near Daggett, San Bernardino County, California.	About 15 kilometers north of Daggett	600
153	Echinocactus polycephalus Engelm. & Bigel	Jan. 6	Between Victor and Stoddard Wells, San Bernardino County, California.		
154	Cereus engelmanni Engelm	do	do		
155		do	do	A gasteromycetous fungus	
156	Garrya veatchii Kellogg	Jan. 4	San Bernardino Mountains, California	Between Martin's ranch and Crowder's ranch, south of Cajon Pass.	
157	Chorizanthe rigida (Torr.) Torr. & Gr	Jan. 7	Between Stoddard Wells and Daggett, San Bernardino County, California.		
158	Larrea tridentata (DC.) Coville	Jan. 8	Near Daggett, San Bernardino County, California.		600
159	Ephedra californica Wats	Jan. 6	Between Victor and Stoddard Wells, San Bernardino County, California.		
160	Mamillaria deserti Engelm	1890. Nov. 27	Reese River Valley, Nevada	Vernon Bailey, collector	1,600
161	Opuntia missouriensis DC	do	do	do	1,600
162	Arenaria macradenia Wats	1891. Jan. 15	At Lone Willow Spring, Panamint Valley, California.	In clefts in the rocks, about the upper spring	780
163	Bigelovia teretifolia (Dur. & Hilg.) Gray	do	do	About the upper springs	780
164	Coleosanthus desertorum Coville	do	do	do	780

165	Coleosanthus atractyloides (Gray) Kuntze	do	do	do	780
166	Cheilanthes	do	do	do	780
167	Echinocactus polyancistrus Engelm. & Bigel	Jan. 10	Mohave Desert, California	Near the "Summit," about 28 kilometers north of Daggett, on the road to Lone Willow Spring	
168	Echinocactus polyancistrus Engelm. & Bigel	Jan. 11	do	At Copper City Spring, on the road from Doggett to Lone Willow Spring.	
169	Salix lævigata Bebb	Jan. 14	At Lone Willow Spring, Panamint Valley, California.	The only tree in the vicinity	750
170		Jan. 11	Paradise Valley, San Bernardino County, California	A lichen, growing on the stones about the margin of a dry lake.	
171	Peucephyllum schottii Gray	Jan. 16	South slope of Browns Peak, Inyo County, California.		950
172	Dalea polyadenia Wats	Jan. 11	Paradise Valley, San Bernardino County, California.		
173	Oryzopsis membranacea (Pursh) Vasey	Jan. 16	South slope of Browns Peak, Inyo County, California.		1,200
174	Eurotia lanata (Pursh) Moq	do	do		1,300
175	Leptosyne bigelovii Gray	do	do		1,450
176	Sphæralcea munroana (Lindl.) Spach	do	do		1,450
177	Eriogonum polifolium Benth	do	do		1,450
178	Gutierrezia microcephala (DC.) Gray	do	do		1,450
179	Bigelovia teretifolia (Dur. & Hilg.) Gray	do	do		1,450
180	Atriplex canescens (Pursh) James	do	do		1,450
181	Atriplex polycarpa (Torr.) Wats	do	do		1,500
182	Lupinus ornatus Lindl	do	do		1,525
183	Viguiera reticulata Wats	do	do		750
184	Aster mohavensis Coville	do	do		750
185	Aplopappus cuneatus Gray	Jan. 17	Slate Range, Inyo County, California	East slope, west of Lone Willow Spring	1,200
186	Coleosanthus atractyloides (Gray) Kuntze	do	do	do	1,275
187	Cereus engelmanni Engelm	do	do	do	1,675
188	Cheilanthes myriophylla Desv	do	do	do	1,150
189	Baccharis sergiloides Gray	do	do	do	1,150
190	Œnothera scapoidea purpurascens Wats	Jan. 20	Near Death Valley, Inyo County, California	In Long Valley	210
191	Hymenoclea salsola Torr. & Gr	do	do	do	70
192	Prosopis juliflora (Swartz) DC	do	Death Valley, Inyo County, California	A few kilometers south of Mesquite Well	—100
193	Suæda suffrutescens Wats	Jan. 21	do	do	—100
194	Cladothrix oblongifolia Wats	Jan. 22	Near Bennett Wells, Death Valley, California	At the foot of the mesa west from the wells	—90
195	Atriplex hymenelytra (Torr) Wats	do	do	do	—90
196	Atriplex polycarpa (Torr.) Wats	do	do	do	—90
197	Cryptanthe ramosissima Greene	do	do	do	—90
198	Euphorbia polycarpa Benth	do	do	do	—90
199	Cryptanthe angustifolia (Torr.) Greene	do	do	do	—90
200	Chorizanthe brevicornu Torr	do	do	do	—90
201	Chænactis attenuata Gray	do	do	do	—90
202	Encelia farinosa Torr	do	do	do	—90
203	Sporobolus airoides (Torr.) Thurb	do	do	In the alkaline soil about the wells	—100
204	Juncus cooperi Engelm	do	do	Margin of the salt marsh, east of the wells	—100
205				Number blank	—90
206	Cryptanthe racemosa (Gray) Greene	Jan. 23	Funeral Mountains, Inyo County, California	South by east from Bennett Wells, in a cañon	350
207	Hofmeisteria pluriseta Gray	do	do	do	350
208	Œnothera cardiophylla Torr	do	do	do	350

Catalogue of specimens—Continued.

No.	Name.	Date.	Locality.	Remarks.	Altitude.
		1891.			*Meters.*
209	Distichlis spicata (L.) Greene	Jan. 24	Furnace Creek Cañon, Funeral Mountains, California.		100
210	Andropogon macrourus Mx	do	do		100
211	Euphorbia polycarpa Benth	do	do		100
212	Solidago spectabilis (Eaton) Gray	do	do		100
213	Psathyrotes ramosissima (Torr.) Gray	do	do		100
214	Physalis crassifolia Benth	do	do		100
215	Salix longifolia Muhl	do	do		100
216	Phacelia pachyphylla Gray	do	do		100
217	Heliotropium curassavicum L	do	do		100
218	Juncus balticus Willd	Jan. 26	do		100
219	Imperata bookeri Rupr	do	do		100
220	Carduus ochrocentrus (Gray) Greene	do	do		100
221	Pluchea sericea (Nutt.) Coville	do	do		100
222	Gilia latifolia Wats	Jan. 27	do	Between Furnace Creek Ranch and the springs, 3 kilometers up the cañon.	100
223	Oxystylis lutea Torr. & Frem	do	do	do	100
224	Epipactis gigantea Hook	do	do	do	150
225	Sisyrinchium bellum Wats	do	do	do	150
226	Juncus balticus Willd	do	do	do	150
227	Juncus balticus Willd	do	do	do	150
228	Sporobolus depauperatus (Hook.) Scribner	do	do	do	150
229	Schœnus nigricans L	do	do	About the springs, 3 kilometers above Furnace Creek Ranch.	150
230	Atrichoseris platyphylla Gray	do	do		150
231	Cladium mariscus (L.) R. Br	do	do		150
232	Eleocharis rostellata Torr	do	do		150
233	Scirpus olneyi Gray	do	do		150
234	Chara fœtida A. Br	do	do		150
235	Eriogonum insigne Wats	do	do		150
236	Eleocharis rostellata Torr	do	do		150
237	Fimbristylis thermalis Wats	do	bo		150
238	Bebbia juncea aspera Greene	do	do		150
239	Eriogonum inflatum Torr. & Frem	do	do		150
240	Imperata hookeri Rupr	do	do		150
241	Polypogon monspeliensis (L.) Desf	Jan. 28	Furnace Creek Ranch, Death Valley, California	Along the irrigating ditch, west of the alfalfa field.	0
242	Panicum crusgalli L	do	do		0
243	Chenopodium murale L	do	do	In the barnyard	0
244	Eragrostis purshii Schrad	do	do	do	0
245	Sorghum halepense Pers	do	do	Along an irrigating ditch	0
246	Sporobolus asperifolius (Nees & Meyen) Thurb	do	do	do	0
247	Dicoria canescens Gray	Feb. 2	Funeral Mountains, Inyo County, California	About 8 kilometers northwest of Saratoga Springs in drifting sand.	75

248	Coldenia plicata (Torr.) Coville	do	do	do	75
249	Petalonyx thurberi Gray	do	do	do	75
250	Abronia villosa Wats	do	do	do	75
251	Abronia villosa Wats	Feb. 3	Death Valley, Inyo County, California	Near Saratoga Springs. Vernon Bailey, collector.	75
252	Mentzelia albicaulis (Hook.) Torr. & Gr	Feb. 2	Funeral Mountains, Inyo County. California	In a wash about 8 kilometers northwest of Saratoga Springs.	250
253	Œnothera brevipes Gray	do	do	do	450
254	Eremiastrum bellioides Gray	do	do	do	525
255	Nicotiana trigonophylla Dunal	do	do	In a cañon about 8 kilometers northwest of Saratoga Springs.	525
256	Hofmeisteria pluriseta Gray	do	do	do	525
257	Salvia	do	do	do	675
258	Sieglingia pulchella (H. B. K) Kuntze	do	do	In a wash about 8 kilometers northwest of Saratoga Springs.	675
259	Aristida bromoides H. B. K	do	do	do	675
260	Amphiachyris fremontii Gray	do	do	do	675
261	Salvia mohavensis Greene	do	do	Near the summit of a peak westward from the Ibex Mine.	875
262	Salix nigra venulosa (Anders.) Bebb	Feb. 6	Resting Springs Valley, Inyo County, California	On the old Mitchell ranch	525
263	Salix longifolia exigua (Nutt.) Bebb	do	do	do	525
264	Atriplex lentiformis (Torr.) Wats	do	do	Near the old Mitchell ranch	525
265	Atriplex lentiformis (Torr.) Wats	do	do	do	525
266	Atriplex torreyi Wats	do	do	do	525
267	Baccharis emoryi Gray	do	do	do	525
268	Bigelovia veneta (H. B. K) Gray	do	do	do	525
269	Aplopappus racemosus virgatus Gray	do	do	do	525
270	Aster carnosus Gray	do	do	do	525
271	Berula erecta (Huds.) Coville	Feb. 7	do	do	500
272	Scirpus americanus Pers	do	do	do	500
273	Helianthus petiolaris Nutt	do	do	do	500
274	Atriplex parryi Wats	do	do	do	500
275	Erythræa nuttallii Wats	do	do	do	500
276	Suæda	do	do	do	500
277	Echinocactus wislizeni lecontei Engelm. & Bigel.	Feb. 9	Resting Springs Mountains, Inyo County, California.	Near the summit of the black peak south of the Resting Springs Mine.	900
278	Echinocactus johnsoni Engelm	do	do	do	930
279	Phoradendron californicum Nutt	Feb. 10	Resting Springs Valley, Inyo County, California	On the old Mitchell ranch	525
280	Bigelovia paniculata Gray	do	do	About 8 kilometers north of Resting Springs	600
281	Elymus triticoides Buckley	do	do	Near the old Mitchell ranch	550
282	Oryzopsis membranacea (Pursh) Vasey	do	do	About 12 kilometers north of Resting Springs	650
283	Eleocharis rostellata Torr	do	do	Near Twelve Mile Spring	800
284	Sisymbrium canescens Nutt	do	do	do	800
285	Lepidium fremontii Wats	do	do	do	800
286	Solidago spectabilis (Eaton) Gray	do	do	do	800
287	Stanleya pinnata (Pursh) Britton	do	do	do	800
288	Achyronychia cooperi Torr. & Gr	Jan. 28	Death Valley, Inyo County, California	Between Bennett Wells and Eagle Borax Works	—100
289	Rosa californica Cham. & Schlecht	Feb. 11	Pahrump Valley, Nye County, Nevada	Winters's ranch	850
290	Astragalus	do	do	do	850
291	Gutierrezia microcephala (DC.) Gray	do	do	do	850
292	Psilostrophe cooperi (Gray) Greene	do	do	do	830
293	Conyza coulteri Gray	do	do	do	850

Catalogue of specimens—Continued.

No.	Name.	Date.	Locality.	Remarks.	Altitude.
		1891.			*Meters.*
294	Salix longifolia Muhl	Feb. 11	Pahrump Valley, Nye County, Nevada	Winters's ranch	850
295	Salix nigra venulosa (Anders.) Bebb	...do	......do	Winters's ranch, cultivated	850
296	Baileya multiradiata Harv. & Gr	Feb. 12	......do	Near Winters's ranch	850
297	Franseria eriocentra Gray	...do	Charleston Mountains, Lincoln County, Nevada.	In a cañon, on the road from Winters's ranch to Clark's sawmill.	1,500
298	Bigelovia mohavensis Greene	...do	......do	......do	1,525
299	Kunzia glandulosa (Curran) Greene	...do	......do	......do	1,525
300	Fallugia paradoxa (Don) Endl	...do	......do	......do	1,575
301	Juniperus californica utahensis Engelm	...do	......do	Below Clark's sawmill	1,585
302	Atriplex phyllostegia (Torr.) Wats	Feb. 4	Near Saratoga Springs, Death Valley, California.		75
303	Atriplex lentiformis (Torr.) Wats	...do	......do		75
304	Suæda suffrutescens Wats	...do	......do		75
305	Suæda suffrutescens Wats	...do	......do		75
306	Ruppia maritima L	Feb. 5	Saratoga Springs, Death Valley, California	In the pool of the main spring	75
307	Phoradendron juniperinum Engelm	Feb. 14	Charleston Mountains, Lincoln County, Nevada.	Near Clark's sawmill. On *Juniperus californica utahensis*.	1.585
308	Razoumofskya divaricata (Engelm.) Coville	...do	......do	Near Clark's sawmill. On *Pinus monophylla*	2,000
309	Lepidospartum striatum Coville	...do	......do	......do	1,800
310	Yucca baccata Torr	...do	......do	A few kilometers below Clark's sawmill	1,585
311	Razoumofskya	Feb. 13	......do	Mountain side north from Clark's sawmill. On *Pinus aristata*.	3,000
312	Arctostaphylos pungens H. B. K	...do	......do	Near Clark's sawmill	2,500
313	Opuntia chlorotica Engelm. and Bigel	Feb. 14	......do	A few miles below Clark's sawmill	2,000
314	Opuntia missouriensis DC	...do	......do	......do	2,200
315	Pinus aristata Engelm	Feb. 13	......do	Mountain side north from Clark's sawmill	2,975
316	Pinus flexilis James	...do	......do	......do	2,975
317	Pinus monophylla Torr. & Frem	...do	......do	About 15 kilometers below Clark's sawmill	2,400
318	Pinus ponderosa scopulorum Engelm	...do	......do	......do	2,525
319	Abies concolor (Gordon) Parry	...do	......do	......do	2,525
320	Mamillaria deserti Engelm	Feb. 12	......do	Near the western base of the mountains, northeast from Winters's ranch.	1,385
321	Cereus mojavensis Engelm. & Bigel	Feb. 14	......do	A few kilometers below Clark's sawmill	1,800
322	Juniperus occidentalis monosperma Engelm.	Feb. 13	......do	Near Clark's sawmill	2,800
323	Mimulus	Feb. 19	Funeral Mountains, Inyo County, California	In the cañon of Mesquite Spring, west of Amargosa Borax Works.	900
324	Perityle emoryi nuda (Torr.) Gray	...do	......do	......do	1,100
325	Eriophyllum ambiguum Gray	...do	......do	......do	950
326	Eremiastrum bellioides orcuttii (Wats.) Coville	...do	......do	......do	950
327	Castilleia parviflora Bong	Feb. 20	......do	Near Mesquite Spring. Vernon Bailey, collector	1,080
328	Stipa viridula Trin	...do	......do	......do	1,080
329	Arenaria macradenia Wats	...do	......do	......do	1,080
330	Mimulus luteus L	...do	......do	At Mesquite Spring. Vernon Bailey, collector.	1,080
331	Parietaria debilis Forst	...do	......do		1,080
332	Macrocalyx membranaceus (Benth.) Kuntze	...do	......do	Cañon of Mesquite Spring	1,000

333	Euphorbia setiloba Engelm	...do	......do	......do	1,000
334	Eschscholtzia minutiflora Wats	...do	......do	......do	1,000
335	Tortula inermis (Muell.) Mont	..do	......do	......do	1,000
336	Grimmia plagiopodia pilifera Lesq. & James	...do	......do	......do	1,000
337	Mimulus	...do	......do	......do	990
338	Cuscuta californica Choisy	...do	......do	Cañon of Mesquite Spring. On *Peucephyllum schottii.*	990
339	Delphinium	...do	......do	......do	1,100
340	Plantago patagonica gnaphaloides (Nutt.) Gray	Feb. 12	Resting Springs Mountains, Inyo County, California.	Near Resting Springs Mine. Vernon Bailey, collector.	750
341	Mentzelia albicaulis (Hook.) Torr. & Gr	...do	......do	......do	750
342	Œnothera refracta Wats	...do	......do	......do	750
343	Sporobolus depauperatus (Hook.) Scribner	Feb. —	......do	Near Twelve Mile Spring. Frank Stephens, collector.	790
344	Aphyllon cooperi Gray	Feb. 28	Funeral Mountains, Inyo County, California	Between Furnace Creek Ranch and Ash Meadows.	900
345	Juncus nodosus L	Mar. 2	Watkins's ranch, Ash Meadows, Nevada	In an alkaline low meadow, about 1 kilometer northwest from the ranch house.	720
346	Pluchea camphorata (L.) DC	...do	......do	In the alkaline meadow west from the ranch house.	720
347	Sporobolus asperifolius (Nees & Meyen) Thurb	...do	......do	......do	720
348	Helianthus petiolaris Nutt	...do	......do	......do	720
349	Asclepias speciosa Torr	...do	......do	......do	720
350	Baccharis sergiloides Gray	Jan. 29	Furnace Creek Cañon, Funeral Mountains, California.	Near the mouth of the cañon	720
351	Mentzelia albicaulis (Hook.) Torr. & Gr	...do	......do	......do	720
352	Sphæralcea munroana (Lindl.) Spach	...do	Death Valley, Inyo County, California	Near the edge of the salt-marsh west of Furnace Creek Ranch.	720
353	Œnothera	Jan. 30	Furnace Creek Cañon, Funeral Mountains, California.	In the dry wash above the springs and on the slopes south of the cañon.	500
354	Cryptanthe angustifolia (Torr.) Greene	.. do	......do	......do	500
355	Peucephyllum schottii Gray	...do	......do	......do	600
356	Petalonyx thurberi Gray	...do	......do	......do	1,050
357	Phacelia pachyphylla Gray	...do	......do	......do	1,050
358	Aster mohavensis Coville	...do	......do	......do	720
359	Œnothera brevipes Gray	Feb. 1	......do	......do	275
360	Cucurbita palmata Wats	Feb. 4 or 5	......do	......do	600
361	Encelia eriocephala Gray	...do	......do	......do	100
362	Juncus balticus Willd	...do	......do	......do	100
363	Astragalus triflorus Gray	...do	......do	......do	100
364	Spartina gracilis Trin	Mar. 2	Near Ash Meadows, Nye County, Nevada	About 1 kilometer south of Devil Hole	740
365	Dodecatheon	...do	......do	......do	740
366	Potentilla eremica Coville	...do	......do	......do	740
367	Nothochlæna parryi Eaton	...do	......do	Rocks about Devil Hole	750
368	Sparganium minimum Fries	...do	......do	In the water of Devil Hole	750
369	Kochia californica Wats	...do	Ash Meadows, Nye County, Nevada	About 1 kilometer east of the house on Watkins's ranch.	720
370	Atriplex phyllostegia (Torr.) Wats	Mar. 3	......do	......do	720
371	Naias marina L	...do	......do	In the lower spring	720
372	Artemisia	Mar. 6	Charleston Mountains, Lincoln County, Nevada	West slope of Mountain Spring Pass	1,650
373	Astragalus triflorus Gray	...do	......do	......do	1,200

Catalogue of specimens—Continued.

No.	Name.	Date.	Locality.	Remarks.	Altitude.
		1891.			*Meters.*
374	Uromyces astragali (Opiz) Sacc. II	Mar. 6	Charleston Mountains, Lincoln County, Nevada.	West slope of Mountain Springs Pass. On *Astragalus triflorus.*	1,200
375	Sporobolus depauperatus (Hook.) Scribner	do	do	At Mountain Springs	1,710
376	Berberis fremontii Torr	do	do	do	1,710
377	Yucca baccata Torr	do	do	West slope of Mountain Springs Pass	1,200
378	Agave utahensis Engelm	do	do	do	1,740
379	Fraxinus anomala Wats	do	do	do	1,570
380	Cereus engelmanni Engelm	do	Pahrump Valley, Nye County, Nevada	Mesa, northwest of Olcott Peak	1,065
381	Opuntia parryi Engelm	do	do	do	1,065
382	Mamillaria deserti Englem	Mar. 7	Charleston Mountains, Lincoln County, Nevada.	East slope of Mountain Springs Pass	1,220
383	Mamillaria deserti Engelm	do	do	do	1,220
384	Opuntia acanthocarpa Engelm. & Bigel	do	do	do	1,400
385	Quercus undulata Torr	do	do	do	1,200
386	Buddleia utahensis Coville	do	do	Near Mountain Springs	1,750
387	Ephedra viridis Coville	Mar. 6	do	In Mountain Springs Pass	1,700
388	Forsellesia spinescens (Gray) Greene	Mar. 7	do	do	1,650
389	Batrachospermum boryanum Sirodot	Mar. 8	Vegas Valley, Lincoln County, Nevada	At Cottonwood Springs	1,065
390	Plantago major L	do	do	Along the stream from Cottonwood Springs	1,065
391	Nostoc verrucosum Vaucher	do	do	At Cottonwood Springs	1,065
392	Chara fœtida A. Br	do	do	do	1,065
393	Targionia hypophylla L	Mar. 9	do	On the north face of a limestone cliff, 1 kilometer east of Cottonwood Springs.	1,065
394	Eriophyllum wallacei Gray	do	do	Between Cottonwood Springs and Vegas Ranch.	1,000
395	Amsonia	do	do	do	1,000
396	Thamnosma montana Torr. & Frem	do	do	do	1,000
397	Porophyllum gracile Benth	do	do		790
398	Astragalus procerus Gray	do	do	About 1.5 kilometers west of the Vegas springs	720
399	Zannichellia palustris L	do	do	In the ditch flowing from the Vegas springs	700
400	Riccia fluitans L	do	do	do	700
401	Lemna valdiviana Phil	do	do	do	700
402	Phacelia pulchella Gray	Mar. 10	Vegas Wash, Lincoln County, Nevada	Near its junction with the Colorado River	300
403	Biscutella californica (Harv.) Wats		do	do	300
404	Gilia	Mar. 12	do	do	300
405	Œnothera scapoidea purpurascens Wats	Mar. 11	do	do	300
406	Lesquerella gordoni sessilis Wats	do	do	do	300
407	Lepidium lasiocarpum Nutt	do	do	do	300
408	Amsinckia tessellata Gray	Mar. 12	do	do	300
409	Linanthus jonesii (Gray) Greene	do	do	do	300
410	Mentzelia albicaulis (Hook.) Torr. & Gr	do	do	do	300
411	Chænactis carphoclinia Gray	do	do	do	300
412	Linanthus demissus (Gray) Greene	do	do	do	300
413	Marilaunidium demissum (Gray) Kuntze	do	do	do	300
414	Helianthella argophylla (Eaton) Gray	do	do	About 5 kilometers from the Colorado River	350
415	Œnothera refracta Wats	do	do	Near its junction with the Colorado River	300

416	Salix	Mar.	11	Along the Colorado River, Nevada	Near the mouth of the Vegas Wash	275
417	Draba sonoræ Greene	do		Vegas Wash, Lincoln County, Nevada	Near its junction with the Colorado River	300
418	Macrocalyx micranthus (Torr.) Coville	do		do	do	300
419	Festuca microstachys Nutt	do		do	do	300
420	Eriophyllum lanosum (Gray.) DC	do		do	do	300
421	Phacelia ivesiana Torr	do		do	do	300
422	Pectocarya linearis (Ruiz & Pav.) DC	do		do	do	300
423	Cryptanthe intermedia (Gray) Greene	do		do	do	300
424	Cryptanthe angustifolia (Torr.) Greene	do		do	do	300
425	Abronia villosa Wats	Mar.	12	do	do	300
426	Streptanthus longirostris Wats	do		do	do	300
427	Baccharis glutinosa Pers	Mar.	11	Mouth of Vegas Wash, Lincoln County, Nevada	On the banks of the Colorado River	275
428	Mamillaria tetrancistra Engelm	Mar.	12	Vegas Wash, Lincoln County, Nevada	E. W. Nelson, collector	300
429	Mamillaria	do		do	do	300
430	Opuntia parryi Engelm	Mar.	16	Vegas Valley, Lincoln County, Nevada	About 20 kilometers west of Towner's ranch	1, 100
431	Opuntia ramosissima Engelm	do			do	1, 100
432	Arctomecon merriami Coville	Mar.	9	do	Between Cottonwood Springs and Vegas Ranch	740
433					Number blank	
434	Aphyllon cooperi Gray	Mar.	21	Funeral Mountains, Inyo County, California	Between Ash Meadows and Furnace Creek	
435	Phacelia crenulata Torr	do		do	do	
436	Phacelia pedicellata Gray	do		do	do	
437	Perityle emoryi nuda (Torr.) Gray	do		do	do	
438	Œnothera brevipes Gray	do		do	do	
439	Atriplex parryi Wats	Mar.	21	Ash Meadows, Lincoln County, Nevada	Along Ash Meadows Creek	710
440	Eremiastrum bellioides orcuttii (Wats.) Coville	do		Funeral Mountains, Inyo County, California	Between Ash Meadows and Furnace Creek	
441	Mentzelia albicaulis (Hook.) Torr. & Gr	do		do	do	
442	Cryptanthe intermedia (Gray) Greene	do		do	do	
443	Cryptanthe angustifolia (Torr.) Greene	do		do	do	
444	Cryptanthe cycloptera Greene	do		do	do	
445	Piptocalyx circumscissus (Hook. & Arn.) Torr	do		do	do	
446	Cryptanthe ramosissima Greene	do		do	do	
447	Œnothera scapoidea Torr. & Gr	do		do	do	
448	Macrocalyx micranthus (Torr.) Coville	do		do	do	
449	Gilia	do		do	do	
450	Gilia	do		do	do	
451	Atrichoseris platyphylla Gray	do		do	do	
452	Malveopsis rotundifolia (Gray) Kuntze	do		do	do	
453	Marilaunidium	do		do	do	
454	Mentzelia reflexa Coville	do		do	do	
455	Phacelia pachyphylla Gray	do		do	do	
456	Gilia latifolia Wats	do		do	do	
457	Peucephyllum schottii Gray	do		do	do	
458	Menodora spinescens Gray	do		do	do	
459	Antirrhinum filipes Gray	do		do	do	
460	Cryptanthe	Mar.	14	Vegas Valley, Lincoln County, Nevada	Between Vegas Ranch and Corn Creek	
461	Œnothera scapoidea Torr. & Gr	Mar.	16	Charleston Mountains, Lincoln County, Nevada	West slope of divide northwest of Towner's	
462	Thelypodium cooperi Wats	Mar.	21	Funeral Mountains, Inyo County, California	Between Ash Meadows and Furnace Creek	
463	Œnothera refracta Wats	do		do	do	
464	Gilia filiformis Parry	do		do	do	
465	Linanthus jonesii (Gray) Greene	do		do	do	
466	Leptosyne bigelovii Gray	do		do	do	
467	Larrea tridentata (DC.) Coville	Mar.	24	Furnace Creek Ranch, Death Valley, California		0

Catalogue of specimens—Continued.

No.	Name.	Date.	Locality.	Remarks.	Altitude.
		1891.			*Meters.*
468	Salix longifolia Muhl	Mar. 24	Furnace Creek Ranch, Death Valley, California.	Growing about the fish ponds	0
469	Salix nigra venulosa (Anders.) Bebb	do	do	Cultivated by the ranch house	0
470	Populus fremontii Wats	do	do	East of the fish ponds	0
471	Œnothera scapoidea purpurascens Wats	do	do	South of the corral	0
472	Malva parviflora L	do	do		0
473	Achyronychia cooperi Torr. & Gr	do	Death Valley, Inyo County, California	Between Tule Wells and Eagle Borax Works	—90
474	Dalea mollis Benth	Mar. 25	do	Between Bennett Wells and Johnson Cañon	0
475	Phacelia crenulata Torr	do	do	do	0
476	Encelia farinosa Torr	do	do	do	0
477	Chorizanthe brevicornu Torr	do	do	do	0
478	Malacothrix glabrata (Eaton) Gray	do	do	do	0
479	Cryptanthe augustifolia (Torr.) Greene	do	do	do	0
480	Cryptanthe ramosissima Greene	do	do	do	0
481	Malveopsis rotundifolia (Gray) Kuntze	do	do	do	0
482	Œnothera brevipes Gray	do	do	do	0
483	Phacelia hispida Gray	do	Panamint Mountains, Inyo County, California	Johnson Cañon, near its mouth	475
484	Amsinckia tessellata Gray	do	do	do	475
485	Cryptanthe	do	do	do	475
486	Pterostegia drymarioides Fisch. & Mey	do	do	do	475
487	Draba sonoræ Greene	do	do	do	475
488	Pectocarya linearis (Ruiz & Pav.) DC	do	do	do	475
489	Filago californica Nutt	do	do	do	475
490	Cotyledon	Mar. 26	do	Johnson Cañon. E. W. Nelson, collector	
491	Astragalus coccineus Brandegee	Mar. 27	do	Near Pete's garden, Johnson Cañon	
492	Salvia columbariæ Benth	Mar. 28	do	do	
493	Salix lasiolepis Benth	Mar. 27	do	do	1,740
494	Anemone sphenophylla Poepp	do	do	do	1,740
495	Astragalus mohavensis Wats	do	do	do	1,740
496	Astragalus amphioxys Gray	do	do	do	1,800
497	Mamillaria tetrancistra Engelm	Mar. 25	do	Near the mouth of Johnson Cañon	475
498	Opuntia rutila Nutt	Mar. 27	do	Near Pete's garden, Johnson Cañon	1,740
499	Lepidium lasiocarpum Nutt	Mar. 30	do	do	1,740
500	Anemone sphenophylla Poepp	do	do	do	1,740
501	Astragalus mohavensis Wats	do	do	do	1,740
502	Nothochlæna parryi Eaton	do	do	do	1,740
503	Aplopappus interior Coville	do	do	do	1,740
504	Thysanocarpus curvipes Hook	do	do	do	1,740
505	Thelypodium cooperi Wats	do	do	do	1,740
506	Trisetum barbatum Steud	do	do	do	1,740
507	Poa fendleriana (Steud.) Vasey	do	do	do	1,740
508	Cymopterus panamintensis Coulter & Rose	do	do	do	1,740
509	Arabis pulchra Wats	do	do	do	1,740
510	Thelypodium lasiophyllum (Hook. & Arn.) Greene	do	do	do	1,740
511	Phacelia fremontii Torr	do	do	do	1,700

512	Sisymbrium canescens Nutt	do	do	do	1,700
513	Astragalus nuttallianus canescens Torr. & Gr.	Mar. 31	do	do	1,700
514	Erodium cicutarium (L.) Ait	do	do	do	1,700
515	Nicotiana trigonophylla Dunal	do	do	do	1,700
516	Phacelia fremontii Torr	do	do	do	1,700
517	Amsinckia tessellata Gray	do	do	do	1,700
518	Sonnea jonesii ((Gray) Greene	do	do	do	1,700
519	Eschscholtzia minutiflora Watson	do	do	do	1,700
520	Lepidium lasiocarpum Nutt	do	do	do	1,700
521	Macrocalyx bipinnatifidus (Torr.) Coville	do	do	do	1,700
522	Trisetum barbatum Steud	do	do	do	1,700
523	Mentzelia albicaulis (Hook.) Torr. & Gr	do	do	do	1,700
524	Phacelia perityloides Coville	do	do	do	1,700
525	Antirrhinum filipes Gray	Apr. 2	do	do	1,400
526	Lotus tomentellus Greene	do	do	do	1,400
527	Argemone platyceras Link & Otto	do	do	do	1,400
528	Leptosyne bigelovii Gray	do	do	do	1,400
529	Calycoseris parryi Gray	do	do	do	1,400
530	Equisetum robustum A. Br	do	do	do	1,400
531	Equisetum variegatum Weber & Mohr	Mar. 31	do	do	1,600
532	Chænactis brachypappa Gray	Apr. 2	do	In Johnson Cañon	1,400
533	Eriophyllum ambiguum Gray	do	do	do	1,400
534	Salvia columbariæ Benth	Apr. 2-4	do	do	1,400
535	Œnothera cæspitosa Nutt	do	do	do	1,400
536	Juniperus occidentalis Hook	Apr. 2	do	Crest of the mountains, about 1.5 kilometers north of Panamint Pass.	2,800
537	Pinus aristata Engelm	do	do	Crest of the mountains, about 5 kilometers north of Panamint Pass.	3,000
538	Pinus flexilis James	do	do	do	3,000
539	Juniperus occidentalis Hook	do	do	On the east slope of the mountains, about 1.5 kilometers north of Panamint Pass.	2,560
540	Cheilanthes myriophylla Desv	do	do	do	2,560
541	Peucedanum parishii Coult. & Rose	do	do	On a hogback about 3 kilometers northwest of Pete's garden.	2,330
542	Pinus monophylla Torr. & Frem	do	do	A. K. Fisher, collector	2,000
543	Astragalus amphioxys Gray	Apr. 3	do	Near the uppermost spring, Johnson Cañon	1,860
544	Opuntia angustata Engelm. & Bigel	do	do	do	1,860
545	Cymopterus terebinthinus Torr. & Gr	do	do	On the east slope of Panamint Pass	2,200
546	Perityle emoryi nuda (Torr.) Gray	Apr. 4	do	In Johnson Cañon	1,400
547	Mohavea breviflora Coville	do	do	do	1,400
548	Phacelia hispida Gray	do	do	do	1,400
549	Nicotiana trigonophylla Dunal	do	do	do	1,400
550	Sphæralcea munroana (Lindl.) Spach	do	do	do	1,450
551	Sonchus asper All	do	do	do	1,450
552	Emmenanthe penduliflora Benth	do	do	do	1,400
553	Œnothera gauræflora Torr. & Gr	do	do	do	1,400
554	Castilleia parviflora Bong	do	do	do	1,400
555	Prunus fasciculata (Torr.) Gray	do	do	do	1,400
556	Uropappus linearifolius (DC.) Nutt	do	do	do	1,400
557	Euphorbia albomarginata Torr. & Gr	do	do	do	1,400
558	Cryptanthe intermedia (Gray) Greene	do	do	do	1,400
559	Cotyledon	do	do	do	1,400

Catalogue of specimens—Continued.

No.	Name.	Date.	Locality.	Remarks.	Altitude.
		1891.			*Meters.*
560	Macrocalyx micranthus (Torr.) Coville	Apr. 4	Panamint Mountains, Inyo County, California.	In Johnson Cañon	1,400
561	Claytonia perfoliata Donn	..do	......do	......do	1,400
562	Gilia	..do	......do	......do	1,450
563	Lepidium lasiocarpum Nutt	..do	......do	......do	1,450
564	Lotus humilis Greene	..do	......do	......do	1.400
565	Lupinus pusillus Pursh	..do	......do	......do	1,400
566	Eleocharis rostellata Torr	..do	......do	......do	1.450
567	Phacelia pachyphylla Gray	Apr. 8	Furnace Creek Cañon, Funeral Mountains, California.	Between Furnace Creek Ranch and the springs.	100
568	Psathyrotes ramosissima (Torr.) Gray	..do	......do	......do	100
569	Scirpus olneyi Gray	..do	......do	......do	100
570	Gilia latifolia Wats	..do	......do	......do	100
571	Œnothera scapoidea purpurascens Wats	..do	......do	......do	100
572	Scirpus americanus Pers	..do	Death Valley, Inyo County, California	At Furnace Creek Ranch	
573	Chenopodium murale L	..do	......do	......do	
574	Melilotus indica (L.) All	..do	......do	......do	
575	Polygonum	..do	......do	......do	
576	Atrichoseris platyphylla Gray	..do	Furnace Creek Cañon, Funeral Mountains, California.	Between Furnace Creek Ranch and the springs.	100
577	Bœrhavia annulata Coville	..do	......do	......do	100
578	Sporobolus airoides (Torr.) Thurb	..do	......do	......do	100
579	Agrostis verticillata Villars	..do	......do	......do	100
580	Schœnus nigricans L	Apr. 7	......do	At the springs	150
581	Epipactis gigantea Hook	..do	......do	......do	150
582	Juncus cooperi Engelm	..do	......do	......do	150
583	Dipetalia subulata (Webb & Berth.) Kuntze	..do	......do	In the dry wash near the springs	150
584	Phyllogonum luteolum Coville	..do	......do	......do	100
585	Euphorbia polycarpa Benth	..do	......do	......do	100
586	Eleocharis rostellata Torr			At the springs	150
587	Linanthus dichotomus Benth	Apr. 5	Paradise Valley, Mohave Desert, California	F. W. Koch, collector	900
588	Lupinus microcarpus Sims	Apr. —	Windy Gap, Inyo County, California	......do	580
589	Phoradendron bolleanum (Seem.) Eichler	Apr. 10	Panamint Mountains, Inyo County, California.	Johnson Cañon, on *Juniperus californica utahensis.*	1,800
590	Gilia	Apr. 5	Paradise Valley, Mohave Desert, California	F. W. Koch, collector	900
591	Arabis pulchra Wats	Apr. 10	Panamint Mountains, Inyo County, California	In Johnson Cañon	1,950
592	Calycoseris wrightii Gray	..do	......do	......do	1,550
593	Cheilanthes myriophylla Desv	Apr. 13	Surprise Cañon, Panamint Mountains, California.	Near Brewery Spring	1,550
594	Cheilanthes viscida Davenp	..do	......do	......do	1,550
595	Cryptanthe	..do	......do	......do	1,550
596	Bigelovia teretifolia (Dur. & Hilg.) Gray	..do	......do	......do	1,550
597	Salix lasiolepis Benth	..do	......do	......do	1,550
598	Salix lævigata Bebb	..do	......do	......do	1.550

599	Aplopappus cuneatus Gray	do	do	do	1,550
600	Lupinus ornatus Lindl	do	do	About 300 meters below Brewery Spring	1,250
601	Salvia carnosa Dougl	do	do	About 250 meters below Brewery Spring	1,300
602	Emmenanthe penduliflora Benth	do	do	do	1,300
603	Calycoseris wrightii Gray	do	do	do	1,300
604	Malacothrix glabrata (Eaton) Gray	do	do	do	1,300
605	Nemoseris neomexicana (Gray) Greene	do	do	do	1,300
606	Astragalus panamintensis Sheldon	do	do	do	1,300
607	Phacelia hispida brachyantha Coville	do	do	do	1,300
608	Claytonia perfoliata Donn	do	do	do	1,300
609	Mamillaria tetrancistra Engelm	do	do	About 200 meters below Brewery Spring	1,350
610	Gymnogramme triangularis Kaulf	Apr. 14	do	About 150 meters below Brewery Spring	1,400
611	Arabis perennans Wats	do	do	do	1,400
612	Lepidium fremontii Wats	do	do	do	1,400
613	Œnothera gauræflora Torr. & Gr	do	do	do	1,400
614	Artemisia spinescens Eaton	do	do	do	1,400
615	Grayia spinosa (Hook.) Moq	do	do	do	1,400
616	Cryptanthe	do	do	do	1,400
617	Bigelovia graveolens (Nutt.) Gray	do	do	do	1,400
618	Rhus trilobata Nutt	Apr. 13	do	Near Brewery Spring. A. K. Fisher, collector	1,550
619	Targionia hypophylla L	Apr. 14	do	About 150 meters below Brewery Spring	1,400
620	Gilia	do	do	Near the old tollhouse	1,300
621	Adiantum emarginatum Hook	do	do	do	1,300
622	Macrocalyx micranthus (Torr.) Coville	do	do	do	1,300
623	Gilia filiformis Parry	do	do	do	1,300
624	Œnothera cardiophylla Torr	do	do	do	1,300
625	Salix lasiolepis Benth	do	do	do	1,300
626	Vitis californica Benth	do	do	do	1,300
627	Uropappus linearifolius (DC.) Nutt	do	do	About 225 meters below Brewery Spring	1,325
628	Selaginella rupestris (L.) Spring	do	do	About 150 meters below Brewery Spring	1,400
629	Euphorbia schizoloba Engelm	do	do	do	1,400
630	Astragalus mohavensis Wats	do	do	do	1,400
631	Mamillaria tetrancistra Engelm	do	do	do	1,400
632	Cereus mojavensis Engelm. & Bigel	do	do	A. K. Fisher, collector	1,350
633	Phacelia rotundifolia Torr	do	do	Near the old tollhouse	1,300
634	Sphæralcea munroana (Lindl.) Spach	do	do	About 200 meters below Brewery Spring	1,350
635	Arabis pulchra Wats	Apr. 15	do	About 75 meters above Brewery Spring	1,625
636	Lepidium lasiocarpum Nutt	do	do	do	1,625
637	Mimulus rubellus Gray	do	do	do	1,625
638	Draba caroliniana micrantha (Nutt.) Gray	do	do	do	1,625
639	Gilia	do	do	do	1,625
640	Stylocline micropoides Gray	do	do	do	1,625
641	Piptocalyx circumscissus (Hook. & Arn.) Torr	do	do	do	1,625
642	Pectocarya setosa Gray	do	do	do	1,625
643	Cheilanthes myriophylla Desv	do	do	do	1,625
644	Forsellesia spinescens (Gray) Greene	do	do	About 100 meters above Brewery Spring	1,650
645	Juniperus californica utahensis Engelm	do	do	do	1,650
646	Pterostegia drymarioides Fisch. & Mey	do	do	About 75 meters above Brewery Spring	1,625
647	Astragalus mohavensis Wats	do	do	do	1,625
648	Lupinus ornatus Lindl	do	do	About 60 meters above Brewery Spring	1,610
649	Œnothera	do	do	About 15 meters above Brewery Spring	1,560
650	Nothochlæna parryi Eaton	do	do	do	1,560

Catalogue of specimens—Continued.

No.	Name.	Date.	Locality.	Remarks.	Altitude.
		1891.			*Meters.*
651	Cheilanthes myriophylla Desv	Apr. 15	Surprise Cañon, Panamint Mountains, California.	About 15 meters above Brewery Spring	1,560
652	Bigelovia graveolens (Nutt.) Gray	do	do	About 90 meters above Brewery Spring	1,640
653	Thamnosma montana Torr. & Frem	do	do	About 150 meters above Brewery Spring	1,700
654	Tricardia watsoni Torr	do	do	About 175 meters above Brewery Spring	1,725
655	Bigelovia	do	do	do	1,725
656	Juniperus californica utahensis Engelm	do	do	do	1,725
657	Macrocalyx micranthus (Torr.) Coville	do	do	About 30 meters below Brewery Spring	1,589
658	Juniperus californica utahensis Engelm	Apr. 10	Johnson Cañon, Panamint Mountains, California.	About 60 meters above Pete's garden	1,610
659	Rhus trilobata Nutt	do	do	do	1,550
660	Leersia trachymitra (Ripart) Holzinger	Apr. 14	Surprise Cañon, Panamint Mountains, California.	About 150 meters below Brewery Spring	1,400
661	Tortula ruralis (L.) Ehrh		do	do	1,400
662	Œnothera refracta Wats	Apr. 17	Panamint Valley, Inyo County, California	About 1.5 kilometers north of Hot Springs	400
663	Œnothera scapoidea Torr. & Gr	do	do	do	400
664	Œnothera scapoidea purpurascens Wats	do	do	do	400
665	Eriogonum reniforme Torr. & Frem	do	do	do	400
666	Œnothera brevipes Gray	do	do	do	400
667	Lygodesmia exigua Gray	do	do	Along the stream from Hall Cañon	400
668	Navarretia setosissima punctata Coville	do	do	do	400
669	Perityle emoryi nuda (Torr.) Gray	do	do	do	400
670	Eriogonum thomasii Torr	do	do	do	400
671	Funaria hygrometrica (L.) Sibth	do	do	do	400
672	Gilia latifolia Wats	do	do	do	400
673	Stylocline micropoides Gray	do	do	do	400
674	Eremiastrum bellioides orcuttii (Wats.) Coville	do	do	do	400
675	Pectocarya linearis (Ruiz & Pav.) DC	do	do	do	400
676	Phacelia crenulata Torr	do	do	do	400
677	Nemacladus ramosissimus Nutt	do	do	do	400
678	Plantago patagonica gnaphaloides (Nutt.) Gray	do	do	do	400
679	Dipetalia subulata (Webb & Berth.) Kuntze	do	do	do	400
680	Eriogonum inflatum Torr. & Frem	do	do	On the mesa just south of Hot Springs	425
681	Salix longifolia Muhl	do	do	At Hot Springs	400
682	Anemopsis californica (Nutt.) Hook. & Arn	do	do	do	400
683	Ruppia maritima L	do	do	do	400
684	Phacelia ivesiana Torr	Apr. 18	do	About 1.5 kilometers north of Hot Springs	400
685	Astragalus mohavensis Wats	do	do	do	400
686	Eriogonum trichopes Torr	do	do	Along the stream from Hall Cañon	400
687	Navarretia schottii Torr	do	do	do	400
688	Mentzelia reflexa Coville	do	do	do	400
689	Equisetum variegatum Weber & Mohr	do	do	do	400
690	Lepidium lasiocarpum Nutt	do	do	do	400

691	Phacelia rotundifolia Torr	do	Hall Cañon, Panamint Mountains, California.	Near the mouth of the cañon	450
692	Gilia filiformis Parry	do	do	do	450
693	Oreocarya holoptera (Gray) Greene	do	do	do	450
694	Gilia	do	do	do	450
695	Sonnea jonesii (Gray) Greene	do	do	do	450
696	Solanum douglasii Dunal	do	do	do	450
697	Senecio mohavensis Gray	do	do	do	450
698	Helianthella argophylla (Eaton) Gray	do	do	do	450
699	Perityle emoryi nuda (Torr.) Gray	do	do	do	450
700	Cryptanthe intermedia (Gray) Greene	Apr. 21	Surprise Cañon, Panamint Mountains, California.	About 30 meters above the mouth of the cañon	640
701	Cryptanthe ramosissima Greene	do	do	do	640
702	Chænactis carphoclinia Gray	do	do	do	640
703	Phacelia pachyphylla Gray	do	do	do	640
704	Cryptanthe racemosa (Gray) Greene	do	do	do	640
705	Oreocarya holoptera (Gray) Greene	do	do	do	640
706	Polypogon monspeliensis (L) Desf	do	do	do	640
707	Mimulus luteus L	do	do	About 90 meters above the mouth of the cañon	700
708	Centaurea melitensis L	do	do	do	700
709	Mentzelia reflexa Coville	do	do	do	700
710	Juncus xiphioides Mey	do	do	do	700
711	Juncus balticus Willd	do	do	do	700
712	Macrocalyx micranthus (Torr.) Coville	do	do	About 180 meters above the mouth of the cañon	800
713	Cryptanthe recurvata Coville	do	do	do	800
714	Cryptanthe submollis (Gray) Coville	do	do	do	800
715	Galium stellatum Kellogg	do	do	do	800
716	Navarretia setosissima punctata Coville	do	do	do	800
717	Echinocactus wislizeni lecontei (Engelm. & Bigel.) Engelm.	do	do	do	800
718	Scirpus americanus Pers	do	do	do	800
719	Carex nebraskensis prævia Bailey	do	do	do	800
720	Cryptanthe cycloptera Greene	do	do	do	800
721	Pectocarya linearis (Ruiz & Pav.) DC	do	do	do	800
722	Salix longifolia Muhl	do	do		700
723	Stanleya pinnata (Pursh) Britton	do	do		700
724	Atriplex canescens (Pursh) James	do	do		700
725	Œnothera cardiophylla Torr	do	do		700
726		do	do	On *Œnothera cardiophylla*	700
727	Malacothrix glabrata (Eaton) Gray	Apr. 22	Panamint Valley, Inyo County, California	About 2 kilometers north of Hot Springs	400
728	Astragalus purshii Hook	Apr. 23	Panamint Mountains, Inyo County, California.	Just below the piñons on the north side of Surprise Cañon. A. K. Fisher, collector.	1,800
729	Ruppia maritima L	Apr. 18	Hot Springs, Panamint Valley, California	In a pool in the mesquites about 400 meters westward from the main spring.	400
730	Nemoseris neomexicana (Gray) Greene	do	Hall Cañon, Panamint Mountains, California		450
731	Calycoseris parryi Gray	Apr. 25	Shepherd Cañon, Argus Mountains, California.		800 to 2,000
732	Aster mohavensis Coville	Apr. 26	do		800 to 2,000
733	Phacelia hispida Gray	do	do		800 to 2,000
734	Lepidium flavum Torr	do	do		800 to 2,000
735	Euphorbia albomarginata Torr. & Gr	Apr. 27	do		800 to 2,000
736	Lotus argensis Coville	Apr. 28	do		800 to 2,000

Catalogue of specimens—Continued.

No.	Name.	Date.	Locality.	Remarks.	Altitude.
		1891.			*Meters.*
737	Delphinium azureum vimineum (Don) Gray	Apr. 27	Shepherd Cañon, Argus Mountains, California.		800 to 2,000
758	Layia glandulosa (Hook.) Hook. & Arn	Apr. 28	do		800 to 2,000
739	Cymopterus terebinthinus Torr. & Gr	do	do		800 to 2,000
740	Mimulus luteus L	do	do		800 to 2,000
741	Mirabilis lævis (Benth.) Curran	Apr. 30	do	Flowers white	800 to 2,000
742	Leptosyne bigelovii Gray	do	do		800 to 2,000
743	Linanthus dichotomus Benth	May 3	Near Maturango Spring, Argus Mountains, California.		1,800
744	Phlox longifolia stansburyi (Torr.) Gray	May 6	Near Willow Creek, Panamint Mountains, California.		1,950
745	Peucedanum parishii Coult. & Rose	May 6–15	do		1,950
746	Ribes leptanthum brachyanthum Gray	May 7	do		1,950
747	Astragalus casei Gray	do	do		1,950
748	Mentzelia albicaulis (Hook.) Torr. & Gr	do	do		1,950
749	Anisocoma acaulis Gray	do	do		1,950
750	Collinsia parryi Gray	May 9	do		1,950
751	Viola præmorsa Doug	May 10	do		1,950
752	Brodiæa capitata Benth	do	do		1,950
753	Œnothera trichocalyx Nutt	May 12	do		1,950
754	Hymenoclea salsola Torr. & Gr	May 14	Mill Creek Cañon, Panamint Mountains, California.		1,300 to 1,700
755	Ptiloria parryi (Gray) Coville	do	do		1,300 to 1,700
756	Salazaria mexicana Torr	do	do		1,300 to 1,700
757	Gilia floccosa Gray	May 15	do		1,300 to 1,700
758	Marilaunidium demissum (Gray) Kuntze	do	do		1,300 to 1,700
759	Œnothera dentata Cav	do	do		1,300 to 1,700
760	Navarretia matthewsii (Gray) Coville	do	do		1,300 to 1,700
761	Mirabilis frœbellii (Behr) Greene	do	do		1,300 to 1,700
762	Œnothera contorta pubens (Wats.) Coville	May 16	do		1,300 to 1,700
763	Phlox gracilis (Dougl.) Greene	May 19	Near Willow Creek, Panamint Mountains, California.	On the hillside north of Willow Creek Camp	1,950 to 2,300
764	Lupinus holosericeus Nutt	do	do	do	1,950 to 2,300
765	Marilaunidium aretioides (Hook. & Arn.) Coville	do	do	do	1,950 to 2,300
766	Piptocalyx circumscissus (Hook. & Arn.) Torr	do	do	do	1,950 to 2,300
767	Prunus fasciculata (Torr.) Gray	do	do	do	1,950 to 2,300
768	Kunzia glandulosa (Curran) Greene	do	do	do	1,950 to 2,300
769	Euphorbia albomarginata Torr. & Gr	do	do	do	1,950 to 2,300
770	Eriogonum pusillum Wats	do	do	do	1,950 to 2,300
771	Œnothera scapoidea purpurascens Wats	do	do	do	1,950 to 2,300
772	Gilia	do	do	do	1,950 to 2,300
773	Lepidium lasiocarpum Nutt	do	do	do	1,950 to 2,300
774	Poa	do	do	do	1,950 to 2,300
775	Festuca microstachys Nutt	do	do	do	1,950 to 2,300

776	Arabis	do		do	do	1,950 to 2,300
777	Cheilanthes myriophylla Desv	do		do	do	1,950 to 2,300
778	Arabis pulchra Wats	do		do	do	1,950 to 2,300
779	Phacelia curvipes Torr	do		do	do	1,950 to 2,300
780	Gilia	do		do	do	1,950 to 2,300
781	Poa	do		do	do	1,950 to 2,300
782	Poa fendleriana (Steud.) Vasey	do		do	On the hillside south of Willow Creek Camp	1,950 to 2,300
783	Astragalus casei Gray	do		do	do	1,950 to 2,300
784	Solanum xanti Gray	do		do	do	1,950 to 2,300
785	Tetradymia canescens DC	do		do	do	1,950 to 2,300
786	Gilia	do		do	do	1,950 to 2,300
787	Opuntia rutila Nutt	do		do	do	1,950 to 2,300
788	Salix longifolia Muhl	May	20	Willow Creek Cañon, Panamint Mountains, California.	do	1,950
789	Peucedanum vaseyi Coult. & Rose	do		Darwin Mesa, Inyo County, California	Along the Darwin road about 3 kilometers southward from Mill Creek Divide.	1,800
790	Caulanthus crassicaulis (Torr.) Wats	do		do	do	1,800
791	Astragalus inyoensis Sheldon	do		do	do	1,800
792	Astragalus atratus Wats	do		do	do	1,800
793	Syntrichopappus fremontii Gray	do		do	About 6 kilometers southeast of Mill Creek Divide, along the road to the old mill.	1,700
794	Aplopappus interior Coville	do		do	do	1,700
795	Calochortus kennedyi Porter	do		do	do	1,700
796	Aphyllon fasciculatum (Nutt.) Torr. & Gr	do		do	About 6 kilometers southeast of Mill Creek Divide. On *Artemisia tridentata*.	1,700
797	Leptosyne bigelovii Gray	do		do	About 6 kilometers southeast of Mill Creek Divide, along the road to the old mill.	1,700
798	Chorizanthe thurberi (Benth.) Wats	do		do	do	1,700
799	Thelypodium cooperi Wats	do		do	do	1,700
800	Pectocarya setosa Gray	do		Mill Creek Cañon, Panamint Mountains, California.	Along the road entering the south fork of the cañon from Darwin.	1,500
801	Prunus fasciculata (Torr.) Gray	do		do	Bottom of the south fork of the cañon	1,400
802	Aplopappus monactis Gray	do		do	do	1,400
803	Cryptanthe barbigera (Gray) Greene	do		do	do	1,400
804	Eriogonum saxatile Wats	do		do	do	1,400
805	Salix nigra venulosa (Anders.) Bebb	do		do	At the fork of the cañon just above the old mill.	1,350
806	Gymnolomia multiflora (Nutt.) Rothr	do		do	Below the old mill	1,300
807	Mimulus	do		do	About 1 kilometer below the old mill	1,250
808	Equisetum lævigatum A. Br	do		do	North fork of the cañon	1,600
809	Epipactis gigantea Hook	do		do	do	1,600
810	Juncus bufonius L	May	21	Willow Creek Cañon, Panamint Mountains, California.	At the lower end of the cañon, where it opens into Saline Valley.	975
811	Nemacladus ramosissimus Nutt	do		do	do	975
812	Monolepis spathulata Gray	do		do	do	975
813	Chenopodium album L	do		do	do	975
814	Phacelia heterosperma Parish	do		do	do	975
815	Chenopodium fremonti Wats	do		do	do	975
816	Bursa divaricata (Nutt.) Kuntze	do		do	do	975
817	Philibertia linearis hirtella Gray	do		do	Within a mile of the lower end of the cañon	1,000
818	Erythræa exaltata (Hook.) Coville	do		do	do	1,000
819	Lotus americanus (Nutt.) Bischof	do		do	do	1,000
820	Œnothera	do		do	do	1,000

Catalogue of specimens—Continued.

No.	Name.	Date.	Locality.	Remarks.	Altitude.
		1891.			*Meters.*
821	Potentilla rivalis millegrana (Engelm.) Wats	May 21	Willow Creek Cañon, Panamint Mountains, California.	Within a mile of the lower end of the cañon	1,600
822	Malveopsis	do	do	do	1,000
823	Rumex salicifolius Weinm	do	do	do	1,000
824	Deschampsia calycina Presl	do	do	do	1,000
825	Amsonia brevifolia Gray	May 22	do		1,000 to 1,800
826	Lycium cooperi Gray	do	do		1,000 to 1,800
827	Elymus condensatus Presl	do	do		1,000 to 1,800
828	Rosa californica Cham. & Schlecht	do	do		1,000 to 1,800
829	Adelia parvifolia (Gray) Coville	do	do		1,000 to 1,800
830	Arenaria macradenia Wats	do	do		1,000 to 1,800
831	Galium matthewsii Gray	do	do		1,000 to 1,800
832	Iva axillaris Pursh	do	do		1,000 to 1,800
833	Elymus elymoides (Raf.) Swezey	do	do		1,000 to 1,800
834	Eriophyllum ambiguum Gray	do	do		1,000 to 1,800
835	Phacelia hispida brachyantha Coville	do	do		1,000 to 1,800
836	Symphoricarpos longiflorus Gray	do	do		1,000 to 1,800
837	Tricardia watsoni Torr	do	do		1,000 to 1,800
838	Eriophyllum pringlei Gray	do	do		1,000 to 1,800
839	Crepis intermedia Gray	do	do		1,000 to 1,800
840	Prunus andersonii Gray	do	do		1,000 to 1,800
841	Pholisma arenarium Nutt	May 10	Mohave Desert, California	Between Indian Wells and Haway Meadows	1,000
842	Oryzopsis membranacea (Pursh) Vasey	May 14	Near Keeler, Inyo County, California	On the sandy mesa east of the town	1,100
843	Atriplex parryi Wats	do	do	do	1,100
844	Franseria dumosa Gray	do	do	do	1,100
845	Abronia turbinata Wats	do	do	do	1,100
846	Biscutella californica (Harv.) Wats	do	do	do	1,100
847	Cleome sparsifolia Wats	do	do	do	1,100
848	Malacothrix sonchoides (Nutt.) Torr. & Gr	do	do	do	1,100
849	Lepidium lasiocarpum Nutt	do	do	do	1,100
850	Piptocalyx circumscissus (Hook. & Arn.) Torr	do	do	do	1,100
851	Gilia leptomeria Gray	do	do	do	1,100
852	Cleomella obtusifolia Torr. & Frem	do	do	do	1,100
853	Cleomella brevipes Wats	May 15	do	do	1,100
854	Ranunculus cymbalaria Pursh	do	do	About an alkaline spring	1,090
855	Distichlis spicata (L.) Greene	do	do	Shore of Owens Lake	1,090
856	Distichlis spicata (L.) Greene	do	do	do	1,090
857	Scirpus nevadensis Wats	do	do	In the water of Owens Lake	1,087
858	Cladophora	do	do		1,100
859	Œnothera alyssoides Hook. & Arn	do	do		1,100
860	Eriogonum reniforme Torr. & Frem	do	do		1,100
861	Œnothera scapoidea Torr. & Gr	do	do	North of the old ranch at Swansea	1,200
862	Gilia latifolia Wats	May 16	do	do	1,200
863	Aster mohavensis Coville	do	do	do	1,200

864	Navarretia setosissima punctata Coville	do	do	do	1,200
865	Chænactis carphoclinia Gray	do	do	do	1,200
866	Orthocarpus	do	do	do	1,200
867	Salazaria mexicana Torr	do	do	do	1,200
868	Sphæralcea munroana (Dougl.) Spach	do	do	do	1,200
869	Eriogonum parryi Gray	do	do	do	1,200
870	Erigeron calvus Coville	do	do	do	1,200
871	Lepidium lasiocarpum Nutt	do	do	do	1,200
872	Sesuvium portulacastrum L	do	do	At the old ranch at Swansea	1,200
873	Atriplex argentea Nutt	do	do	do	1,200
874	Eremocarya micrantha (Torr.) Greene	do	do	do	1,200
875	Atriplex phyllostegia (Torr.) Wats	do	do	do	1,200
876	Polypogon monspeliensis (L.) Desf	do	do	do	1,200
877	Lupinus brevicaulis Wats	do	Darwin Mesa, Inyo County, California	On the trail from Keeler to Jackass Spring	1,650
878	Lepidium lasiocarpum Nutt	May 23	do	do	1,650
879	Lycium andersonii Gray	do	do	do	1,650
880	Echinocactus polyancistrus Engelm. & Bigel	do	Base of Cerro Gordo Peak, Inyo County, California.	do	2,100
881	Cereus engelmanni Engelm	do	Near Keeler, Inyo County, California	In the cañon northeast of Swansea station	1,300
882	Juniperus californica utahensis Engelm	May 27	Coso Mountains, Inyo County, California	T. S. Palmer, collector	1,800
883	Prunus andersonii Gray	May 26	do	do	1,800
884	Cleomella brevipes Wats	do	Near Keeler, Inyo County, California	Shore of Owens Lake. In intensely alkaline soil with *Distichlis maritima*.	1,090
885	Navarretia matthewsii (Gray) Coville	June 6	Near Lone Pine, Inyo County, California	In the cemetery north of the village	1,150
886	Gilia floccosa Gray	June 7	do	do	1,150
887	Piptocalyx circumscissus (Hook. & Arn.) Torr.	do	do	do	1,150
888	Astragalus eremicus Sheldon	do	do	In the mesa back of the cemetery	1,150
889	Eriophyllum wallacei Gray	do	do	do	1,150
890	Acamptopappus sphærocephalus Gray	do	do	do	1,150
891	Lepidum fremontii Wats	do	do	do	1,150
892	Chænactis stevioides Hook. & Arn	do	do	do	1,150
893	Aplopappus monactis Gray	do	do	do	1,150
894	Suæda torreyana Wats	do	do	Margin of the swamp on the Harvey ranch	1,125
895	Glycyrrhiza lepidota Pursh	do	do	do	1,125
896	Mimulus luteus L	do	do	Swamp west of the house on the Harvey ranch.	1,150
897	Trifolium involucratum Willd	do	do	do	1,150
898	Asclepias speciosa Torr	do	do	do	1,150
899	Mimulus luteus L	do	do	do	1,150
900	Lotus oblongifolius (Benth.) Greene	do	do	do	1,150
901	Juncus phæocephalus paniculatus Engelm	do	do	do	1,150
902	Eleocharis rostellata Torr	do	do	do	1,150
903	Atriplex fasciculata Wats	June 11	Darwin Mesa, Inyo County, California	On the road from Keeler to Darwin	1,150
904	Œnothera	do	Near Keeler, Inyo County, California	In the cañon through which the Darwin-Keeler road descends into Owens Valley.	1,300
905	Kochia americana Wats	do	Darwin Mesa, Inyo County, California	On the road from Keeler to Darwin	1,450
906	Lessingia lemmoni Gray	do	do	At the eastern base of the Coso Mountains on the old road from Coso to the stone corral.	1,600
907	Lycium cooperi Gray	do	do	do	1,600
908	Linanthus aureus (Nutt.) Greene	do	do	do	1,600
909	Eriogonum angulosum Benth	June 12	Near Crystal Spring, Coso Mountains, California.	In the wash below the spring	1,825
910	Gilia	do	do	do	1,825

Catalogue of specimens—Continued.

No.	Name.	Date.	Locality.	Remarks.	Altitude.
		1891.			*Meters.*
911	Mentzelia congesta Nutt	June 12	Near Crystal Spring, Coso Mountains, California.	In the garden by the spring	1,830
912	Scrophularia californica Cham	do	do	do	1,830
913	Nicotiana attenuata Wats	do	do	do	1,830
914	Elymus elymoides (Raf.) Swezey	do	do	do	1,830
915	Hilaria mutica (Buckley) Benth	do	do	By the old Indian wicky-ups	1,830
916	Arenaria macradenia Wats	do	do	do	1,830
917	Uromyces striatus Schrœter	do	do	In the wash below the spring. On *Euphorbia albomarginata*.	1,825
918	Aplopappus interior Coville	do	do	On the hillside by the cabin	1,830
919	Pentstemon palmeri Gray	do	do	Just above the spring	1,840
920	Cryptanthe pterocarya (Torr.) Greene	do	do	do	1,840
921	Chænactis xantiana Gray	do	do	do	1,840
922	Pentstemon glaber Pursh	do	do	do	1,840
923	Ephedra viridis Coville	do	do	do	1,840
924	Cryptanthe	do	do	do	1,840
925	Caulanthus pilosus Wats	do	do	do	1,840
926	Eriogonum pusillum Wats	do	do	On the mesa below the spring	1,830
927	Opuntia rutila Nutt	do	do	On the mesa south of the spring	1,830
928	Bursa divaricata (Nutt.) Kuntze	do	do	In the garden by the spring	1,830
929	Lycium cooperi Gray	do	do	On the mesa south of the spring	1,830
930	Tetradymia spinosa Hook. & Arn	do	do	In the cañon next south of Crystal Spring	1,850
931	Erigeron	do	do	do	1,850
932	Phacelia ramosissima Hook	do	do	do	1,850
933	Mentzelia congesta Nutt	do	do	do	1,850
934	Linanthus breviculus (Gray) Greene	do	do	do	1,850
935	Hulsea	do	do	do	1,850
936	Melica stricta Boland	do	do	do	1,850
937	Mentzelia albicaulis (Hook.) Torr. & Gr	do	do	do	1,850
938	Œnothera contorta Lehm	do	do	do	1,850
939	Abronia turbinata Wats	June 13	do	Wash leading down from Crystal Spring	1,800
940	Malacothrix coulteri Gray	do	do	do	1,800
941	Symphoricarpos longiflorus Gray	do	do	do	1,800
942	Sisymbrium diffusum Gray	do	do	On rocks in the cañon of the wash leading from Crystal Spring.	1,700
943	Coleosanthus linifolius (Eaton) Kuntze	do	Darwin Mesa, Inyo County, California	Along the Darwin-Keeler road a few kilometers west of Darwin.	1,450
944	Opuntia basilaris Engelm. & Bigel	do	do	do Flowers cream-white.	1,450
945	Baileya multiradiata pleniradiata (Harv. & Gr.) Coville.	do	do	Near the stone corral of the mesa	1,450
946	Stanleya elata Jones	do	do	In the wash descending from the Darwin mesa to Owens Valley on the Darwin-Keeler road.	1,400

947	Coldenia nuttallii Hook	do	do	do	1,200
948	Chænactis macrantha Eaton	do	do	do	1,200
949	Psathyrotes annua (Nutt.) Gray	June 14	Near Lone Pine, Inyo County, California	In sand hills near the mouth of Owens River along the Keeler-Lone Pine road.	1,200
950	Dalea polyadonia Wats	do	do	do	1,100
951	Sida hederacea (Hook.) Torr	do	do	On the mesa, 3 kilometers south from Lone Pine in exsiccated hollows.	1,100
952	Œnothera californica Wats	do	do	do	1,125
953	Verbena bracteosa Mx	do	do	do	1,125
954	Sidalcea malvæflora (DC.) Gray	do	do	About 1 kilometer north of Lone Pine	1,125
955	Calochortus invenustus Greene	do	do	About 1 kilometer north of Lone Pine, in moist soil.	1,175
956	Mentzelia lævicaulis (Hook.) Torr. & Gr	do	Near Independence, Inyo County, California.		1,175
957	Uromyces glycyrrhizæ (Rabenh.) Magn. II	June 7	Near Lone Pine, Inyo County, California	On *Glycyrrhiza lepidota*	1,200
958	Solidago elongata Nutt	May 19	Panamint Mountains, California	Along Willow Creek	1,175
959	Scrophularia californica Cham	May 26	do	do	1,950
960	Smilacina stellata (L.) Desf	do	do	do	1,950
961	Ribes aureum Pursh	May 27	do	In Cottonwood Cañon	1,950
962	Amelanchier alnifolia Nutt	do	do	do	
963	Eriogonum nidularium Coville	May 28	do	do	
964	Chorizanthe thurberi (Benth.) Gray	do	do	do	
965	Lotus	do	do	do	
966	Eriogonum polifolium Benth	do	do	do	
967	Ptiloria pentachæta (Eaton) Greene	do	do	do	
968	Œnothera gauræflora Torr. & Gr	do	do	do	
969	Juncus xiphioides Mey	do	do	do	
970	Epipactis gigantea Hook	do	do	do	
971	Polypogon monspeliensis (L.) Desf	do	do	do	
972	Apocynum cannabinum L	do	do	do	
973	Populus fremontii Wats	do	do	do	
974	Scirpus americanus Pers	do	do	do	
975	Atrichoseris platyphylla Gray	June 1	Grapevine Mountains, California	In Boundary Cañon	
976	Physalis crassifolia Benth	do	do	do	
977	Lupinus brevicaulis Wats	June 2	do	do	
978	Calochortus flexuosus Wats	do	Grapevine Mountains, Nevada	In Big Horn Cañon	
979	Eriogonum parryi Gray	June 3	Grapevine Mountains, California	do	
980	Petalonyx nitidus Wats	June 6	do	do	
981 to 995				Numbers blank	
996	Populus monilifera Ait	June 19	West side of Owens Lake, California	Along Cottonwood Creek	1,100
997	Fraxinus	do	do		1,100
998	Fraxinus coriacea Wats	do	do		1,100
999	Eleocharis parishii Britton	do	West shore of Owens Lake, California	Between Cottonwood Creek and Walker's ranch	1,090
1000	Eleocharis rostellata Torr	do	do	do	1,090
1001	Adelia parvifolia (Gray) Coville	do	West side of Owens Lake, California	In a wash north of Cottonwood Creek	1,100
1002	Spartina gracilis Trin	June 20	Haway Meadows, Inyo County, California	In the meadow directly in front of the house	1,150
1003	Cleomella parviflora Gray	do	do	do	1,150
1004	Sidalcea malvæflora (DC.) Gray	do	do	do	1,150
1005	Eucnide urens (Gray) Parry	do	Between Mohave and Keeler, California	On the rocky cliff just north of the house	1,075

Catalogue of specimens—Continued.

No.	Name.	Date.	Locality.	Remarks.	Altitude.
		1891.			*Meters.*
1006	Cyperus lævigatus L	June 20	Between Mohave and Keeler, California	In the roadside spring about 1 kilometer south of Little Owens Lake.	925
1007	Stillingia paucidentata Wats	do	do	About 6 kilometers south of Little Owens Lake.	900
1008	Euphorbia	June 21	do	A few kilometers north of Indian Wells	750
1009	Nicolletia occidentalis Gray	do	do	do	750
1010	Asclepias mexicana Cav	do	do	do	750
1011	Cucurbita palmata Wats	do	do	do	750
1012	Œnothera californica Wats	do	do	do	750
1013	Eriogonum brachyanthum Coville	do	do	do	750
1014	Eleocharis parishii Britton	do	East slope of Walker Pass, Kern County, California.	In a spring by the roadside	1,200
1015	Salvia carnosa Dougl	do	do		1,300
1016	Pholisma arenarium Nutt	do	do		1,300
1017	Lotus procumbens Greene	do	do		1,300
1018	Mirabilis lævis (Benth.) Curran	do	do		1,300
1019	Eriogonum baileyi Wats	do	do		1,300
1020	Encelia frutescens Gray	do	do		1,300
1021	Fremontodendron californicum (Torr.) Coville	do	Summit of Walker Pass, Kern County California.		1,550
1022	Lemmonia californica Gray	do	West slope of Walker Pass, Kern County, California.	In sandy soil along Canebrake Creek	1,400
1023	Marilaunidium demissum (Gray) Kuntze	do	do	do	1,400
1024	Rhamnus tomentella Benth	do	do		1,400
1025	Pinus sabiniana Lamb	do	do	On a north slope	1,400
1026	Ceanothus cuneatus (Hook.) Nutt	June 22	South Fork of Kern River, California		1,000
1027	Cercis occidentalis Gray	do	do		830
1028	Quercus wislizeni DC	do	do		800
1029	Eriophyllum confertiflorum (DC.) Gray	do	do	Growing on rocks by the roadside	800
1030	Bikukulla chrysantha (Hook. & Arn.) Coville	do	do	do	800
1031	Eriogonum nudum pauciflorum Wats	do	do	do	800
1032	Ceanothus divaricatus Nutt	do	do		800
1033	Chorizanthe xanti Wats	do	North Fork of Kern River, California	About 3 kilometers south of Kernville	750
1034	Eriodictyon californicum (Hook. & Arn.) Greene	do	do	do	750
1035	Yucca whipplei Torr	do	South Fork of Kern River, California		750
1036	Hypericum anagalloides Cham. & Schlecht	June 23	Near Kernville, Kern County, California	About 1.5 kilometers south of Kernville	750
1037	Alsinella	do	do	do	750
1038	Mimulus palmeri Gray	do	do	do	750
1039	Mimulus pilosus (Benth.) Wats	do	do	do	750
1040	Gayophytum lasiospermum Greene	do	do	do	750
1041	Boisduvalia stricta (Gray) Greene	do	do	do	750
1042	Equisetum variegatum Weber & Mohr	do	do	do	750
1043	Callitriche bolanderi Hegelm	do	do	do	750
1044	Quercus douglasii Hook. & Arn	do	Kern River Valley, Kern County, California	About 10 kilometers south of Kernville	750
1045	Chorizanthe thurberi (Benth.) Wats	do	do	On the divide between Kernville and Havilah	900 to 1,450

1046	**Bigiopappus leptocladus Gray**	do	do	do	900 to 1,450
1047	**Psoralea californica Wats**	do	do	do	900 to 1,450
1048	**Linum micranthum Gray**	do	do	do	900 to 1,450
1049	**Navarretia setiloba Coville**	do	do	do	900 to 1,450
1050	**Eulophus pringlei Coult & Rose**	do	do	do	900 to 1,450
1051	Linanthus parviflorus (Benth.) Greene	do	do	do	900 to 1,450
1052	Phacelia	do	do	do	900 to 1,450
1053	Lagophylla ramosissima Nutt	do	do	do	900 to 1,450
1054	Cryptanthe flaccida (Lehm.) Greene	do	do	do	900 to 1,450
1055	Pectocarya setosa Gray	do	do	do	900 to 1,450
1056	Emmenanthe penduliflora Benth	do	do	do	900 to 1,450
1057	Madia elegans Lindl	do	do	do	900 to 1,450
1058	Cryptanthe intermedia (Gray) Greene	do	do	do	900 to 1,450
1059	Chenopodium californicum Wats	do	do	do	900 to 1,450
1060	Clarkia xantiana Gray	do	do	do	900 to 1,450
1061	Galium andrewsii Gray	do	do	do	900 to 1,450
1062	Ribes leptanthum Gray	do	do	do	900 to 1,450
1063	Cercocarpus parvifolius Nutt	do	do	do	900 to 1,450
1064	Solanum xanti Gray	do	do	do	900 to 1,450
1065	Convolvulus longipes Wats	do	do	do	900 to 1,450
1066	Galium multiflorum Kellogg	do	do	do	900 to 1,450
1067	Balsamorhiza deltoidea Nutt	do	do	do	900 to 1,450
1068	Eriogonum virgatum Benth	do	Near Havilah, Kern County, California	A few kilometers north of Havilah	900
1069	Bloomeria crocea (Torr.) Coville	do	do	do	900
1070	Matricaria discoidea DC	do	do	do	900
1071	Godetia williamsoni Dur. & Hilg	do	do	do	900
1072	Asclepias eriocarpa Benth	do	do	do	900
1073	Razoumofskya occidentalis (Engelm.) Kuntze	do	do	About a kilometer north of Havilah. On *Pinus sabiniana*.	900
1074	Mimulus	do	do	About 1 kilometer north of Havilah	900
1075	Lonicera interrupta Benth	do	do	do	900
1076	Æsculus californica (Spach) Nutt	do	do	do	900
1077	Ribes menziesii Pursh	June 24	do	About 1 kilometer southeast of the town	900
1078	Œnothera micrantha Hornem	do	do	do	975
1079	Prunus demissa (Nutt.) Walp	do	do	do	975
1080	Oxytheca inermis Wats	do	do	do	975
1081	Euphorbia ocellata Dur. & Hilg	do	do	do	975
1082	Œnothera contorta Lehm	do	do	do	975
1083	Calyptridium monandrum Nutt	do	do	do	975
1084	Mimulus	do	do	do	975
1085	Plagiobothrys tenellus (Hook.) Gray	do	do	do	975
1086	Mentzelia dispersa Wats	do	do	do	975
1087	Viola præmorsa Dougl	do	do	do	975
1088	Gilia gilioides (Benth.) Greene	do	do	do	975
1089	Pectocarya penicillata (Hook. & Arn.) A. DC	do	do	do	975
1090	Chorizanthe uniaristata Torr. & Gr	do	Walker Basin, Kern County, California	Along the Kernville-Caliente road	1,000
1091	Lœflingia squarrosa Nutt	do	do	do	1,000
1092	Potamogeton foliosus niagarensis (Tuckerm.) Morong.	do	do	In the stream at the southwest end of the valley.	950
1093	Monardella lanceolata Gray	do	Near Walker Basin, Kern County, California.	On the north slope of the divide between Walker Basin and Caliente.	1,100
1094	Silene californica Durand	do	do	do	1,100

Catalogue of specimens—Continued.

No.	Name.	Date.	Locality.	Remarks.	Altitude.
		1891.			*Meters.*
1095	Pentstemon breviflorus Lindl	June 24	Near Walker Basin, Kern County, California.	On the north slope of the divide between Walker Basin and Caliente.	1,100
1096	Pentstemon lætus Gray	...do	Near Caliente, Kern County, California	On the south slope of the divide between Walker Basin and Caliente.	800 to 1,100
1097	Calochortus venustus Benth	...do	......do	......do	800 to 1,100
1098	Galium angustifolium Nutt	...do	......do	......do	800 to 1,100
1099	Godetia bottæ Spach	...do	......do	......do	800 to 1,100
1100	Chorizanthe xanti Wats	...do	......do	......do	800 to 1,100
1101	Hemizonia heermanni Greene	...do	......do	......do	800 to 1,100
1102	Carduus californicus (Gray) Greene	...do	......do	......do	800 to 1,100
1103	Quercus wislizeni DC	...do	......do	......do	800 to 1,100
1104	Clarkia elegans Lindl	...do	......do	......do	800 to 1,100
1105	Carduus occidentalis Nutt	...do	......do	......do	800 to 1,100
1106	Cotyledon	...do	......do	......do	750
1107	Isomeris arborea globosa Coville	...do	......do	Caliente Creek, a few kilometers above Caliente.	500
1108	Linanthus pharnaceoides (Benth.) Greene	...do	......do	On the hills south of Caliente	400
1109	Urtica urens L	June 25	Near Keene, Kern County, California	About 3 kilometers west of the station	750
1110	Verbena prostrata R. Br	...do	......do	A roadside weed	750
1111	Quercus lobata Nee	...do	Near Tehachapi Pass, Kern County, California.	On the Caliente-Tehachapi road, west of the pass.	1,000
1112	Astragalus oocarpus Gray	...do	......do	......do	1,000
1113	Monardella lanceolata Gray	...do	......do	......do	1,000
1114	Daucus pusillus Mx	...do	......do	......do	1,000
1115	Eschscholtzia crocea Benth	...do	Tehachapi Valley, Kern County, California.	A few kilometers west of Tehachapi	1,250
1116	Grindelia	...do	......do	......do	1,250
1117	Rumex salicifolius Weinm	...do	......do	......do	1,250
1118	Carduus	...do	......do	A few kilometers east of Tehachapi	1,250
1119	Lupinus microcarpus Sims	...do	......do	......do	1,250
1120	Vicia californica Greene	...do	......do	......do	1,200
1121	Elymus elymoides (Raf.) Swezey	...do	......do	......do	1,200
1122	Senecio eurycephalus Torr. & Gr	...do	......do	......do	1,200
1123	Eleocharis palustris (L.) R. & S	...do	Tehachapi Lake, Kern County, California.	In the salt marsh about the lake	1,200
1124	Scirpus maritimus L	...do	......do	......do	1,200
1125	Juncus balticus Willd	...do	......do	......do	1,200
1126	Salicornia herbacea L	...do	......do	......do	1,200
1127	Frankenia grandifolia Cham. & Schlecht	...do	......do	......do	1,200
1128	Atriplex hastata L	...do	......do	......do	1,200
1129	Atriplex argentea Nutt	...do	......do	......do	1,200
1130	Hordeum maritimum With	...do	Tehachapi Valley, Kern County, California.	Roadside in the east end of the valley	1,200
1131	Eriogonum nudum Benth	June 26	Tehachapi Cañon, Kern County, California.		1,050
1132	Isomeris arborea Nutt	...do	......do		1,050
1133	Eriogonum angulosum Benth	...do	Mohave Desert, Kern County, California.	At the mouth of Tehachapi Cañon	975
1134	Eriogonum angulosum Benth	...do	......do	......do	975

1135	Chorizanthe watsoni Torr. & Gr	do	do	Between Mohave and Tehachapi Cañon	950
1136	Chorizanthe perfoliata Gray	do	do	do	950
1137	Eriogonum baileyi Wats	do	do	Between Mohave and Willow Spring	850
1138	Eriogonum brachyanthum Coville	do	do	do	850
1139	Quercus lobata Nee	June 27	Antelope Valley, Mohave Desert, California.	Near Liebre Ranch house	1,150
1140	Quercus dumosa Nutt	do	do	do	1,150
1141	Quercus douglasii Hook. & Arn	do	do	do	1,150
1142	Eriodictyon tomentosum Benth	June 28	Cañada de las Uvas, Kern County, California.	About 7 kilometers southeast from Fort Tejon	1,050
1143	Pentatemon centranthifolins Benth	do	do	do	1,050
1144	Aplopappus monactis Gray	do	do	do	1,050
1145	Clarkia elegans Lindl	June 29	Fort Tejon, Kern County, California	Along the stream that flows through the old parade ground.	975
1146	Chara altaica A. Br	July 1	Castac Lake, Kern County, California	In the western margin of the lake	1,050
1147	Ruppia maritima L	do	do	Abundant in all the shallows of the lake	1,050
1148	Juncus rugulosus Engelm	do	Near Castac Lake, Kern County, California	In the natural meadows south of the lake	1,050
1149	Pellæa andromedæfolia (Kaulf.) Fée	July 2	Near Fort Tejon, Kern County, California	On hillsides southwest of the fort	1,000
1150	Godetia bottæ Spach	do	do	do	1,000
1151	Clarkia xantiana Gray	do	do	do	1,000
1152	Quercus wislizeni DC	do	do	do	1,000
1153	Zauschneria californica Presl	do	do	do	1,000
1154	Phacelia ramosissima Hook	do	do	do	1,000
1155	Cotyledon	do	do	do	1,000
1156	Quercus chrysolepis Liebm	do	do	do	1,000
1157	Velæa kelloggii (Gray) Coult. & Rose	do	do	do	1,000
1158	Malacothrix altissima Greene	do	do	do	1,000
1159	Aphyllon californicum (Cham. & Schlecht.) Gray.	do	do	do	1,000
1160	Pseudotsuga macrocarpa (Torr.) Lemmon	do	do	do	1,000
1161	Arctostaphylos glauca Lindl	do	do	do	1,000
1162	Leptotænia californica Nutt	do	do	do	1,000
1163	Populus monilifera Ait	July 5	Cañada de las Uvas, Kern County, California.	About 3 kilometers northward from Fort Tejon	900
1164	Acer negundo L	do	do	do	900
1165	Sambucus glauca Nutt	do	do	do	900
1166	Acer macrophyllum Pursh	July 6	Near Fort Tejon, Kern County, California	Along Johnson Creek, back of the fort	950
1167	Pentstemon ternatus Gray	tdo	do	do	950
1168	Amelanchier pallida Greene	do	do	do	950
1169	Lonicera subspicata Hook. & Arn	do	do	do	950
1170	Hetorogaura heterandra (Torr.) Coville	do	do	do	950
1171	Osmorrhiza brachypoda Torr	do	do	do	950
1172	Madia hispida (DC) Greene	do	do	do	950
1173	Gilia densifolia Benth	July 7	Tejon Mountains, Kern County, California	At the head of a cañon, about 3 kilometers south of Fort Tejon.	1,100
1174	Collinsia tinctoria Benth	do	do	do	
1175	Thysanocarpus curvipes Hook	do	do	do	
1176	Calochortus venustus Benth	do	do	do	
1177	Calochortus venustus purpurascens Wats	do	do	do	
1178	Castilleia affinis Hook. & Arn	do	do	do	
1179	Calochortus invenustus Greene	do	do	do	
1180	Gayophytum lasiospermum Greene	do	do	do	

Catalogue of specimens—Continued.

No.	Name.	Date.	Locality.	Remarks.	Altitude.
		1891.			*Meters.*
1181	Heterogaura heterandra (Torr.) Coville	July 7	Tejon Mountains, Kern County, California.	At the head of a cañon, about 3 kilometers south of Fort Tejon.	
1182	Clarkia rhomboidea Dougl	do	do	do	
1183	Galium multiflorum Kellogg	do	do	do	
1184	Eriophyllum cæspitosum Lindl	do	do	do	
1185	Silene luisana Wats	do	do	On the mountain slopes south of Fort Tejon	
1186	Cryptanthe ambigua (Gray) Greene	do	do	do	
1187	Galium aparine L	do	do	do	
1188	Abies concolor (Gordon) Parry	do	do	do	
1189	Phacelia tanacetifolia Benth	do	do	do	
1190	Phacelia curvipes Torr	do	do	do	
1191	Symphoricarpos rotundifolius Gray	do	do	do	
1192	Phoradendron bolleanum (Seem.) Eichler	do	do	On *Abies concolor*	
1193	Platystemon californicus Benth	do	do	On the mountain slopes south of Fort Tejon	
1194	Ceanothus vestitus Greene	do	do	do	
1195	Arctostaphylos parryana Lemmon	do	do	do	
1196	Astragalus purshii Hook	do	do	do	
1197	Scutellaria angustifolia Pursh	July 9	Frazier Mountain, Ventura County, California.	On the western slope, among the piñons	
1198	Potentilla	do	do	do	
1199	Lessingia tenuis (Gray) Coville	do	do	do	
1200	Quercus californica (Torr.) Cooper	do	do	On the western slope, in *Pinus jeffreyi*	
1201	Erysimum asperum (Nutt.) DC	do	do	do	
1202	Ceanothus cordulatus Kellogg	do	do	do	
1203	Delphinium parishii Gray	do	do	Near the summit of the mountain	2,350
1204	Thalictrum fendleri platycarpum Trelease	do	do	By a spring near the summit of the mountain	2,350
1205	Veronica americana Benth	do	do	do	3,350
1206	Pentstemon labrosus (Gray) Hook. f	do	do	On the northwest slope, in *Pinus jeffreyi*	
1207	Chænactis santolinoides Gray	do	do	do	
1208	Ceanothus integerrimus Hook. & Arn	do	do	On the northwest slope of the mountain	
1209	Epilobium glaberrimum Barbey	do	do	In a rivulet on the northwest slope	
1210	Leptobryum pyriforme (L.) Wils	do	do	do	
1211	Bryum bimum Schreb	do	do	do	
1212	Artemisia dracunculoides Pursh	do	Cañada de las Uvas, Los Angeles County, California.		1,050
1213	Micrampelis macrocarpa Greene	do	do	do	
1214	Pinus jeffreyi Balfour	do	Frazier Mountain, Ventura County, California.	do	
1215	Populus trichocarpa Torr. & Gr	July 12	Tejon Cañon, Kern County, California	Near the lower end of the cañon	
1216	Godetia purpurea (Curtis) Wats	do	do		
1217	Godetia williamsoni Dur. & Hilg	do	do		
1218	Libocedrus decurrens Torr	do	do		
1219	Aspidium rigidum argutum (Kaulf.) Eaton	do	do		
1220	Chlorogalum pomeridianum (Ker) Kunth	do	do		

1221	Cornus occidentalis (Torr. & Gr.) Coville	do	do		
1222	Velæa parishii Coult. & Rose	do	Near Tejon Pass, Kern County, California	On the summit of a divide a few kilometers north of Tejon Pass proper.	
1223	Pinus ponderosa London	do	Tejon Cañon, Kern County, California		
1224	Amelanchier alnifolia Nutt	do	do		
1225	Bigelovia	do	Near Tejon Pass, Kern County, California		
1226	Elymus	do	Tejon Cañon, Kern County, California		
1227	Gomphocarpus tomentosus (Torr.) Gray	do	do		
1228	Carduus drummondii (Torr. & Gr.) Coville	do	do		
1229	Pinus jeffreyi Balfour	do	Near Tejon Pass, Kern County, California.	A few kilometers north of Tejon Pass proper	
1230	Suæda intermedia Wats	July 13	Near Bakersfield, Kern County, California.	About 25 kilometers south of Bakersfield	400
1231	Frankenia grandifolia Cham. & Schlecht	do	do	do	400
1232	Allenrolfea occidentalis (Wats.) Kuntze	do	do	do	400
1233	Suæda suffrutescens Wats	do	do	do	400
1234	Salicornia ambigua Mx	do	do	do	400
1235	Atriplex tularensis Coville	do	do	do	400
1236	Salix nigra venulosa (Anders.) Bebb	do	do	do	400
1237	Cephalanthus occidentalis L	do	do	do	400
1238	Atriplex lentiformis (Torr.) Wats	do	do	do	400
1239	Abronia pogonantha Heimerl	do	do	About 8 kilometers, south of Bakersfield	400
1240	Scirpus maritimus L	do	do	In the half-dried alkaline bed of a stream, about 6 kilometers south of Bakersfield.	400
1241	Juncus nodosus megacephalus Torr	do	do	Along a ditch, about 5 kilometers south of Bakersfield.	400
1242	Ceratophyllum demersum L	July 15	do	Along a ditch, in the northern edge of the town	400
1243	Potamogeton foliosus niagarensis (Tuckerm.) Morong.	do	do	do	400
1244	Potamogeton lonchites Tuckerm	do	do	do	400
1245	Epilobium holosericeum Trelease	do	do	do	400
1246	Epilobium holosericeum Trelease	do	do	do	400
1247	Atriplex	do	Poso Creek, Kern County, California	About 20 kilometers up the creek from Poso	
1248	Mimulus pilosus (Benth.) Wats	do	do	do	
1249	Atriplex	July 16	Near Poso, California	About 1.5 kilometers east of Poso	100
1250	Hemizonia pungens (Hook. & Arn.) Torr. & Gr.	July 17	Near Tule River, California	On a ranch just south of the river	100
1251	Atriplex argentea Nutt	do	Near Tulare, Tulare County, California	In a field near the town	100
1252	Ammania ramosior L	do	Near Visalia, Tulare County, California	Along an irrigating ditch	100
1253	Juncus xiphioides Mey	July 20	do	About 1 kilometer northeast of the town	100
1254	Lippia nodiflora (L.) Mx	do	do	do	100
1255	Eleocharis palustris (L.) R. & S	do	do	do	100
1256	Solanum nigrum L	do	do	do	100
1257	Trifolium variegatum melananthum (Hook. & Arn.) Greene.	do	do	do	100 100
1258	Anthemis cotula L	do	do	do	100
1259	Trifolium obtusiflorum Hook	do	do	do	100
1260	Mollugo verticillata L	do	do	do	100
1261	Ilysanthes gratioloides (L.) Benth	do	do	do	100
1262	Polygonum hydropiperoides Mx	do	do	do	100
1263	Atemisia ludoviciana Nutt	do	do	do	100
1264	Mentha canadensis L	do	do	do	100
1265	Polygonum acre H. B. K	do	do	do	100
1266	Polygonum emersum (Mx.) Britton	do	do	do	100
1267	Salix longifolia argyrophylla (Nutt.) Anders	do	do	About 3 kilometers northeast of the town	100

Catalogue of specimens—Continued.

No.	Name.	Date.	Locality.	Remarks.	Altitude.
		1891.			*Meters.*
1268	Salix lasiolepis Benth	July 20	Near Visalia, Tulare County, California	About 3 kilometers northeast of the town	100
1269	Eleocharis acicularis (L.) R. & S	do	do	About 1 kilometer northeast of the town	100
1270	Eleocharis atropurpurea (Retz.) Kunth	do	do	do	100
1271	Fimbristylis vahlii (H. B. K.) Link	do	do	do	100
1272	Ammania coccinea Rottb	do	do	do	100
1273	Cyperus aristatus Rottb	do	do	do	100
1274	Alisma plantago L	do	do	do	100
1275	Marsilia vestita Hook. & Grev	do	do	do	100
1276	Juncus dubius Engelm	do	do	do	100
1277	Panicum crusgalli L	do	do	do	100
1278	Potamogeton lonchites Tuckerm	do	do	do	100
1279	Panicum sanguinale L	do	do	do	100
1280	Panicum	July 21	do	do	100
1281	Paspalum distichum L	do	do	do	100
1282	Phalaris intermedia angusta (Nees) Chapm	do	do	do	100
1283	Potamogeton spirillus Tuckerm	July 25	do	In a ditch about 6 kilometers east of the town	100
1284	Trichostema lanceolatum Benth	do	Near Three Rivers, Tulare County, California	Along the road	
1285	Cyperus acuminatus Torr. & Hook	July 26	do	Along a ditch on the ranch at Three Rivers	
1286	Panicum dichotomum L	do	do	On the bank of Kaweah River, at Three Rivers	
1287	Erythræa venusta Gray	do	do	do	
1288	Mimulus floribundus Lindl	do	do	do	
1289	Alsinella	do	do	do	
1290	Hypericum anagalloides Cham. & Schlecht	do	do	do	
1291	Alsine media L	do	do	do	
1292	Gnaphalium palustre Nutt	do	do	do	
1293	Heterocodon rariflorum Nutt	do	do	do	
1294	Sphærocarpus terrestris californicus (Aust.) Underwood.	do	do	do	
1295	Riccia californica Aust	do	do	do	
1296	Nemacladus ramosissimus Nutt	do	do	do	
1297	Equisetum variegatum Weber & Mohr	do	do	do	
1298	Ranunculus aquatilis trichophyllus (Chaix.) Gr.	do	do	Kaweah River, at Three Rivers	
1299	Rhamnus crocea Nutt	do	Kaweah River Valley, Tulare County, California.	About 1 kilometer above Three Rivers	
1300	Fraxinus dipetala Hook. & Arn	do	do	A few kilometers above Three Rivers	
1301	Adenostoma fasciculatum Hook. & Arn	do	do	Between Three Rivers and the bridge about 12 kilometers above.	
1302	Juncus effusus L	do	do	At the bridge about 12 kilometers above Three Rivers.	
1303	Fraxinus oregona Nutt	do	do	do	
1304	Fimbriaria californica Hampe	do	do	do	
1305	Butneria occidentalis (Hook. & Arn.) Coville	July 27	do	A few kilometers above Kane Flat	
1306	Umbellularia californica (Hook. & Arn.) Nutt	do	do	do	
1307	Chamæbatia foliolosa Benth	do	do	do	

1308	Juncus dubius Engelm	do	do	do	
1309	Ceanothus divaricatus Nutt	do	do	do	
1310	Malveopsis fremontii (Gray) Greene	do	do	do	
1311	Dendromecon rigidum Benth	do	do	do	
1312	Arctostaphylos	do	do	do	
1313	Libocedrus decurrens Torr	do	do	do	
1314	Quercus breweri Engelm	do	do	do	
1315	Linanthus androsaceus (Benth.) Greene	July 28	do	Roadside at Big Tree Cañon	
1316	Gayophytum eriospermum Coville	do	do	do	
1317	Eriogonum virgatum Benth	do	do	About 1 kilometer below Big Tree Cañon.	
1318	Gilia virgata floribunda Gray	do	do	do	
1319	Gilia gilioides (Benth.) Greene	do	do	do	
1320	Godetia	do	do	do	
1321	Mimulus	do	do	do	
1322	Eschscholtzia hypecoides Benth	do	do	do	
1323	Lotus crassifolius (Benth.) Greene	do	do	do	
1324	Lessingia leptoclada microcephala Gray	do	do	do	
1325	Hookera coronaria Salisb	do	do	Near the mouth of Big Tree Cañon	
1326	Sedum radiatum Wats	do	do	do	
1327	Juncus xiphioides montanus Engelm	do	do	do	
1328	Heuchera micrantha Dougl	do	do	do	
1329	Eriogonum saxatile Wats	do	do	do	
1330	Senecio triangularis Hook	do	do	do	
1331	Epilobium glaberrimum Hook	do	do	do	
1332	Thysanocarpus curvipes Hook	do	do	do	
1333	Habenaria elegans (Lindl.) Boland	do	do	do	
1334	Juncus effusus L	do	do	do	
1335	Habenaria leucostachys (Lindl.) Wats	do	do	do	
1336	Datisca glomerata (Presl) Brew. & Wats	do	do	do	
1337	Tellima bolanderi (Gray) Boland	do	do	Along the stream in Big Tree Cañon	
1338	Nemophila maculata Benth	do	do	do	
1339	Draperia systyla (Gray) Torr	do	do	do	
1340	Ribes sanguineum variegatum Wats	July 29	do	do	
1341	Rubus parviflorus Nutt	do	do	do	
1342	Stachys albens Gray	do	do	do	
1343	Woodwardia radicans (L.) Smith	do	do	do	
1344	Carex deweyana bolanderi (Olney) W. Boott	do	do	do	
1345	Arabis glabra (L.) Weinm	do	do	Big Tree Cañon, in dry soil under the pines.	
1346	Bromus orcuttianus Vasey	do	do	do	
1347	Galium triflorum Mx	do	do	In Big Tree Cañon, along the stream	
1348	Cystopteris fragilis (L.) Bernh	do	do	do	
1349	Pellæa ornithopus Hook	do	do	do	
1350	Arabis arcuata (Nutt.) Gray	do	do	In Big Tree Cañon, in dry, rocky soil	
1351	Adiantum pedatum L	do	do	In Big Tree Cañon, along the stream	
1352	Glyceria nervata (Willd.) Trin	do	do	do	
1353	Juncoides campestre (L.) Kuntze	do	do	do	
1354	Carex amplifolia Boott	do	do	do	
1355	Potentilla glandulosa Lindl	do	do	do	
1356	Agoseris grandiflora (Nutt.) Greene	do	do	do	
1357	Castilleia miniata Benth	do	do	do	
1358	Bryum alpinum L	do	do	do	
1359	Lilium pardalinum Kellogg	do	do	do	

Catalogue of specimens—Continued.

No.	Name.	Date.	Locality.	Remarks.	Altitude.
		1891.			*Meters.*
1360	Azalea occidentalis Hook	July 29	Kaweah River Valley, Tulare County, California.	In Big Tree Cañon, along the stream	
1361	Juncus nevadensis Wats	do	do	do	
1362	Osmorrhiza nuda Torr	do	do	Big Tree Cañon, in dry soil under the pines	
1363	Pleuricospora fimbriolata Gray	do	do	do	
1364	Asarum majus (Duchartre) Coville	do	do	do	
1365	Sarcodes sanguinea Torr	do	do	do	
1366	Carex multicaulis Bailey	do	do	do	
1367	Epilobium angustifolium L	do	do	Big Tree Cañon, in moist soil	
1368	Heracleum lanatum Mx	do	do	do	
1369	Circæa pacifica Asch. & Magn	do	do	do	
1370	Claytonia perfoliata Donn	do	do	do	
1371	Aquilegia truncata Fisch. & Mey	do	do	do	
1372	Viola glabella Nutt	do	do	do	
1373	Balsamorrhiza invenusta (Greene) Coville	do	do	Big Tree Cañon, in dry soil under the pines	
1374	Hieracium albiflorum Hook	do	do	do	
1375	Stropholirion californicum Torr	do	do	do	
1376	Ceanothus diversifolius Kellogg	do	do	do	
1377	Pterospora andromedea Nutt	July 30	Near Mineral King, Sierra Nevada, California.	About 6 kilometers below Mineral King	
1378	Geranium richardsonii Fisch. & Traut	do	do	do	
1379	Ceanothus cordulatus Kellogg	do	do	do	
1380	Castanopsis chrysophylla (Hook.) DC	do	do	do	
1381	Ceanothus parvifolius (Wats.) Trelease	do	do	do	
1382	Corallorhiza multiflora Nutt	do	do	do	
1383	Lupinus cytisoides Agardh	July 31	Mineral King, Sierra, Nevada, California	About 1 kilometer above the old hotel, on the hillside facing north.	2,750
1384	Ribes viscosissimum Pursh	do	do	do	2,750
1385	Pedicularis semibarbata Gray	do	do	do	2,750
1386	Monardella villosa glabella Gray	do	do	do	2,750
1387	Thalictrum fendleri platycarpum Trelease	do	do	do	2,750
1388	Arabis	do	do	do	2,750
1389	Arabis repanda Wats	do	do	do	2,750
1390	Castilleia parviflora Bong	do	do	do	2,750
1391	Ribes cereum Dougl	do	do	do	2,750
1392	Cymopterus terebinthinus Torr. & Gr	do	do	do	2,750
1393	Agoseris retrorsa (Benth.) Greene	do	do	do	2,750
1394	Crepis intermedia pleurocarpa Gray	do	do	do	2,750
1395	Hemizonia wheeleri Gray	do	do	do	2,750
1396	Lappula diffusa (Lehm.) Greene	do	do	About 1 kilometer above the old hotel, in the swamps along the stream.	2,750
1397	Solidago multiradiata scopulorum Gray	do	do	do	2,750
1398	Pulmonaria sibirica L	do	do	do	2,750
1399	Potentilla gracilis rigida (Nutt.) Wats	do	do	do	2,750

1400	Phleum alpinum L	do	do	do	2,750
1401	Polygonum bistortoides Pursh	do	do	do	2,750
1402	Allium validum Wats	do	do	do	2,750
1403	Barbarea vulgaris R. Br	do	do	do	2,750
1404	Poa pratensis L	do	do	do	2,750
1405	Carex festiva Dewey	do	do	do	2,750
1406	Helenium hoopesii Gray	do	do	do	2,750
1407	Delphinium scopulorum subalpinum Gray	do	do	do	2,750
1408	Arnica chamissonis Less	do	do	do	2,750
1409	Erigeron salsuginosus (Richards.) Gray	do	do	do	2,750
1410	Bikukulla formosa (Andr.) Coville	Aug. 1	Near Mineral King, Sierra Nevada, California.	South slope of mountain north from the old hotel.	2,750
1411	Gilia achilleæfolia Benth	do	do	do	2,750
1412	Streptanthus tortuosus Kellogg	do	do	do	
1413	Castilleia	do	do	do	
1414	Ribes leptanthum Gray	do	do	do	
1415	Lonicera conjugialis Kellogg	do	do	do	
1416	Pinus monticola Lamb	do	do	do	
1417	Pinus balfouriana Jeffr	do	do	do	
1418	Pellæa bridgesii Hook	do	do	do	
1419	Arctostaphylos nevadensis Gray	do	do	do	
1420	Fimbriaria bolanderi Aust	do	do	do	
1421	Juncus parryi Engelm	do	do	do	
1422	Corallorhiza multiflora Nutt	do	do	do	
1423	Ribes lacustre molle Gray	Aug. 2	do	Along the trail to Farewell Gap	2,800
1424	Lonicera involucrata Banks	do	do	do	2,800
1425	Sorbus occidentalis (Wats.) Greene	do	do	do	2,800
1426	Carex ablata Bailey	Aug. 3	do	In a natural meadow along the stream, about 1 kilometer above the old hotel.	2,750
1427	Salix macrocarpa argentea Bebb	do	do	do	2,750
1428	Carex jonesii Bailey	do	do	do	2,750
1429	Carex aurea Nutt	do	do	do	2,750
1430	Cardamine breweri Wats	do	do	do	2,750
1431	Carex utriculata minor Boott	do	do	do	2,750
1432	Carex tolmiei subsessilis Bailey	do	do	do	2,750
1433	Triglochin palustre L	do	do	do	2,750
1434	Pedicularis grœnlandica Retz	do	do	do	2,750
1435	Alsine longipes (Goldie) Coville	do	do	do	2,750
1436	Dodecatheon	do	do	do	2,750
1437	Carex ablata Bailey	do	do	do	2,750
1438	Carex filiformis latifolia Bœck	do	do	do	2,750
1439	Epilobium brevistylum Barbey	do	do	do	2,750
1440	Smilacina amplexicaulis Nutt	do	do	On the hillside sloping north, 1 kilometer above the old hotel.	2,750
1441	Convolvulus villosus (Kellogg) Gray	do	do	do	2,750
1442	Apocynum androsæmifolium L	do	do	do	2,750
1443	Pentstemon bridgesii Gray	do	do	do	2,750
1444	Salix flavescens Nutt	do	do	do	2,750
1445	Symphoricarpos rotundifolius Gray	do	do	do	2,750
1446	Phlox douglasii Hook	do	do	do	2,750
1447	Calochortus nudus Wats	do	do	do	2,750
1448	Spraguea umbellata Torr	do	do	do	2,750

Catalogue of specimens—Continued.

No.	Name.	Date.	Locality.	Remarks.	Altitude.
		1891.			*Meters.*
1449	Pentatemon confertus procerus (Graham) Coville	Aug. 3	Near Mineral King, Sierra Nevada, California.	On the hillside sloping north, 1 kilometer above the old hotel.	2,750
1450	Arabis hirsuta (L.) Scop	do	do	do	2,750
1451	Eriogonum umbellatum Torr	do	do	do	2,750
1452	Collomia grandiflora Lindl	do	do	do	2,750
1453	Oxytheca spergulina (Gray) Greene	do	do	do	2,750
1454	Pellæa densa (Brack.) Hook	Aug. 4	do	About 1.5 kilometers below Mineral King	2,700
1455	Amelanchier alnifolia Nutt	do	do	do	2,700
1456	Mimulus breweri (Greene) Coville	do	do	do	2,700
1457	Mimulus nasutus Greene	do	do	do	2,700
1458	Dodecatheon jeffreyi Moore	do	do	do	2,700
1459	Helenium bigelovii Gray	do	do	do	2,700
1460	Razoumofskya cryptopoda (Engelm.) Coville	do	do	About 2 kilometers below Mineral King. On *Pinus jeffreyi.*	2,700
1461	Linanthus androsaceus (Benth.) Greene	do	do	About 2 kilometers below Mineral King	2,700
1462	Sidalcea spicata (Regel) Greene	do	do	do	2,700
1463	Pentatemon azureus parvulus Gray	do	do	do	2,700
1464	Hookera coronaria Salisb	do	do	About 1 kilometer below Mineral King	2,700
1465	Veratrum californicum Durand	do	do	do	2,700
1466	Senecio serra Hook	do	do	do	2,700
1467	Comandra pallida A. DC	do	do	do	2,700
1468	Madia elegans Lindl	do	do	do	2,700
1469	Lophanthus urticifolius Benth	do	do	do	2,700
1470	Populus tremuloides Mx	do	do	Opposite the old hotel, on a north slope	2,750
1471	Veronica serpyllifolia L	do	do	do	2,750
1472	Erigeron salsuginosus (Richards.) Gray	do	do	do	2,750
1473	Trifolium monanthum Gray	do	do	do	2,750
1474	Mimulus primuloides Benth	do	do	do	2,750
1475	Selinum capitellatum (Gray) Wats	do	do	do	2,750
1476	Potentilla glandulosa Lindl	do	do	do	2,750
1477	Sisymbrium incisum Engelm	do	do	do	2,750
1478	Lupinus argenteus decumbens (Torr.) Wats	do	do	do	2,750
1479	Angelica lineariloba Gray	do	do	do	2,750
1480	Fritillaria atropurpurea Nutt	do	do	do	2,750
1481	Melampsora farinosa Pers. II	do	do	Opposite the old hotel. On *Salix*	2,750
1482	Razoumofskya occidentalis (Engelm.) Kuntze	do	do	On *Abies magnifica*	
1483	Gilia nuttallii Gray	Aug. 5	do	About half way between Mineral King and Farewell Gap.	
1484	Lappula diffusa (Lehm.) Greene	do	do	do	
1485	Chrysopsis breweri Gray	do	do	do	
1486	Valeriana sylvatica Richards	do	do	do	
1487	Erysimum asperum perenne Wats	do	do	do	
1488	Heuchera rubescens Torr	do	do	do	
1489	Kelloggia galioides Torr	do	do	do	

1490	Holodiscus discolor (Pursh) Maxim	do	do	do	
1491	Senecio lugens Richards	Aug. 6	do	About 300 meters above Mineral King, near a mountain lakelet.	
1492	Arabis platysperma Gray	do	do	do	
1493	Galium bifolium Wats	do	do	do	
1494	Pentstemon newberryi Gray	do	do	do	
1495	Trisetum spicatum (L.) Richter	do	do	do	
1496	Ribes viscosissimum Pursh	do	do	do	
1497	Hydrophyllum occidentale (Wats.) Gray	do	do	About 350 meters above Mineral King, near a mountain lakelet. On *Allium validum*.	3,100
1498	Juncus nevadensis Wats	do	do	About 350 meters above Mineral King, near a mountain lakelet.	3,100
1499	Uromyces bicolor Ellis	do	do	do	3,100
1500	Carex festiva stricta Bailey	do	do	do	3,100
1501	Pellæa breweri Eaton	do	do	do	3,100
1502	Cryptogramma acrostichoides R. Br	do	do	do	3,100
1503	Juncus parryi Engelm	do	do	do	3,100
1504	Arenaria congesta Nutt	do	do	do	3,100
1505	Carex filifolia Nutt	do	do	do	3,100
1506	Carex canescens dubia Bailey	do	do	do	3,100
1507	Vaccinium cespitosum Mx	do	do	do	3,100
1508	Polygonum imbricatum Wats	do	do	do	3,100
1509	Riccia glauca L	do	do	do	3,100
1510	Fimbriaria bolanderi Aust	do	do	do	3,100
1511	Sauteria limbata Aust	do	do	do	3,100
1512	Fritillaria atropurpurea Nutt	do	do	do	3,100
1513	Aquilegia pubescens Coville	do	do	do	3,100
1514	Hieracium horridum Fries	do	do	do	3,100
1515	Arabis platysperma Gray	Aug. 7	do	do	3,100
1516	Allotropa virgata Torr. & Gr	do	do	do	3,100
1517	Claytonia triphylla Wats	do	do	do	3,100
1518	Oreobroma nevadensis (Gray) Howell	do	do	do	3,100
1519	Saxafraga nivalis L	do	do	do	3,100
1520	Collinsia parviflora Lindl	do	do	do	3,100
1521	Ribes cereum Dougl	do	do	do	3,100
1522	Nemophila spatulata Coville	do	do	do	3,100
1523	Tellima tenella (Nutt.) Walp	do	do	do	3,100
1524	Mimulus rubellus Gray	do	do	do	3,100
1525	Juncus nevadensis Wats	do	do	do	3,100
1526	Pedicularis attollens Gray	do	do	do	3,100
1527	Mimulus luteus alpinus Gray	do	do	do	3,100
1528	Aitonia erythrosperma (Aust.) Underwood	do	do	Near the White Chief Mine	
1529	Sedum roseum (L.) Scop	do	do	do	
1530	Sedum stenopetalum Pursh	do	do	do	
1531	Pulsatilla occidentalis (Wats.) Freyn	do	do	do	
1532	Lychnis californica Wats	do	do	do	
1533	Jamesia americana Torr. & Gr	do	do	do	
1534	Ranunculus oxynotus Gray	do	do	do	
1535	Juncoides spicatum (L.) Kuntze	do	do	do	
1536	Potentilla	do	do	do	
1537	Erigeron uniflorus L	do	do	do	
1538	Zygadenus venenosus Wats	do	do	do	

Catalogue of specimens—Continued.

No.	Name.	Date.	Locality.	Remarks.	Altitude.
		1891.			*Meters.*
1539	Eriogonum marifolium Torr. & Gr	Aug. 7	Near Mineral King, Sierra Nevada, California.	Near the White Chief Mine	
1540	Juncus subtriflorus (Mey.) Coville	do	do	do	
1541	Draba lemmoni Wats	do	do	do	
1542	Juncoides divaricatum (Wats.) Coville	do	do	do	
1543	Allium tribacteatum Torr	do	do	do	
1544	Raillardella argentea Gray	do	do	do	
1545	Raillardella scaposa eisoni Gray	do	do	Summit of the mountain south of the White Chief Mine. Vernon Bailey, collector.	
1546	Arenaria	do	do	Summit of the mountain south of the White Chief Mine.	
1547	Arabis platysperma Gray	do	do	do	
1548	Phlox douglasii Hook	do	do	do	
1549	Eriogonum	do	do	do	
1550	Lupinus breweri Gray	do	do	Summit of the mountain south of the White Chief Mine. Vernon Bailey, collector.	
1551	Phacelia magellanica (Lam.) Coville	do	do	Above timber line, near the White Chief Mine.	
1552	Vaccinium cespitosum Mx	do	do	do	
1553	Juncoides campestre sudeticum (Willd.) Coville.	do	do	do	
1554	Kalmia glauca microphylla Hook	do	do	do	
1555	Bryanthus breweri Gray	do	do	do	
1556	Ledum glandulosum Nutt	do	do	do	
1557	Phegopteris alpestris (Swartz) Mett	do	do	do	
1558	Potentilla procumbens (L.) Clairv.	do	do	do	
1559	Bikukulla pauciflora (Wats.) Coville	do	do	do	
1560	Veronica alpina L	do	do	do	
1561	Astragalus atratus Wats	do	do	do	
1562	Saxifraga bryophora Gray	do	do	do	
1563	Juncus subtriflorus (Mey.) Coville	do	do	On the trail to Farewell Gap	
1564	Salix glauca villosa (Hook.)	Aug. 8	do	do	
1565	Aster andersonii Gray	do	do	do	
1566	Collinsia wrightii Wats	do	do	do	
1567	Ranunculus alismæfolius alismellus Gray	do	do	do	
1568	Draba stenoloba Ledeb	do	do	do	
1569	Collinsia parviflora Lindl	do	do	do	
1570	Alsine baicalensis Coville	do	do	do	
1571	Pedicularis grœnlandica Retz	do	do	do	
1572	Salix barclayi Anders	do	do	do	
1573	Jungermannia muelleri danensis Underwood	Aug. 10	do	Farewell Gap	3,350
1574	Pentstemon davidsonii Greene	do	do	do	3,350
1575	Crepis nana Richards	do	do	do	3,350
1576	Erigeron compositus Pursh	do	do	Lyon Meadow, on the trail between Mineral King and Kern River.	
1577	Scirpus microcarpus Presl	do	Valley of the North Fork of Kern River, Tulare County, California.	do	

1578	Erigeron armorifolius DC	do	do	do	
1579	Potentilla purpurascens pinetorum Coville	do	do	do	
1580	Gentiana serrata holopetala Gray	Aug. 11	do	Trout Meadows, on the trail between Mineral King and Kern River.	1,825
1581	Aster	do	do	do	1,825
1582	Claytonia chamissoi Ledeb	do	do	do	1,825
1583	Castilleia minor Gray	do	do	do	1,825
1584	Polygonum amphibium L	Aug. 12	do	In a meadow pond between Trout Meadows and Kern River.	1,850
1585	Potamogeton foliosus Raf	do	do	do	1,850
1586	Limosella aquatica L	do	do	do	1,850
1587	Razoumofskya occidentalis (Engelm.) Kuntze	do	do	Between Trout Meadows and Kern River. On *Abies concolor*.	1,830
1588	Juncus nevadensis Wats	Aug. 14	do	At Soda Springs	2,150
1589	Juncus orthophyllus Coville	do	do	do	2,150
1590	Aster	do	do	do	2,150
1591	Rudbeckia californica Gray	do	do	do	2,150
1592	Solidago elongata Nutt	do	do	do	2,150
1593	Gentiana amarella acuta (Mx.) Hook. f	do	do	do	2,150
1594	Artemisia dracunculoides Pursh	do	do	do	2,150
1595	Hypericum formosum scouleri (Hook.) Coult	do	do	do	2,150
1596	Razoumofskya americana (Nutt.) Kuntze	Aug. 16	do	At Soda Springs. On *Pinus murrayana*	2,150
1597	Razoumofskya cryptopoda (Engelm.) Coville	do	do	At Soda Springs. On *Pinus jeffreyi*	2,150
1598	Frasera tubulosa Coville	Aug. 17	do	At Soda Springs, in dry soil under the pines	2,150
1599	Chænactis douglasii (Hook.) Hook. & Arn		do	do	2,150
1600	Aplopappus bloomeri Gray	Aug. 14	do	do	2,150
1601	Tetradymia canescens DC	do	do	do	2,150
1602	Adenostegia rigida brevibracteata (Gray) Greene	do	do	do	2,150
1603	Eriogonum wrightii subscaposa Wats	do	do	do	2,150
1604	Erigeron breweri Gray	do	do	do	2,150
1605	Aster canescens viscosus (Nutt.) Gray	Aug. 17	do	do	2,150
1606	Marilaunidium rothrockii (Gray) Kuntze	do	do	Along the Hockett Trail, about 3 kilometers northeast of Soda Springs.	2,400
1607	Orochænactis thysanocarpha (Gray) Coville	do	do	do	2,400
1608	Aplopappus apargioides Gray	Aug. 19	Whitney Meadows, Sierra Nevada, California	In rather dry soil near the margin of the meadows	2,850
1609	Troximon	do	do	do	2,850
1610	Solidago multiradiata scopulorum Gray	do	do	do	2,850
1611	Trisetum	do	do		2,850
1612	Eulophus parishii Coult. & Rose	do	do	In rather dry soil in the margin of the meadows	2,850
1613	Sisymbrium incisum Engelm	do	do	do	2,850
1614	Polygonum	do	do	do	2,850
1615	Carex festiva Dewey	do	do		2,850
1616	Scirpus pauciflorus Lightf	do	do		2,850
1617	Epilobium anagallidifolium Lam	do	do		2,850
	Claytonia chamissoi Ledeb	do	do		2,830
1702	'ontia fontana L	do	do		2,850
1703	E'locarya californica (Fisch. & Mey.) Greene	do	do		2,850
1704	G ronica serpyllifolia L	do	do		2,850
1705	Sa theca spergulina (Gray) Greene	do	do	Dry soil about the meadows	2,850
1706	Ca ntilla santolinoides (Gray) Greene	do	do	do	2,850
1707	Jun ntilla	do	do	Rather dry soil in the margin of the meadows	2,850
1708	Sene dus leptaleus Gray	do	do	Dry soil about the meadows	2,850

Catalogue of specimens—Continued.

No.	Name.	Date.	Locality.	Remarks.	Altitude.
		1891.			*Meters.*
1626	Pinus murrayana Balfour	Aug. 19	Near Whitney Meadows, Sierra Nevada, California.		2,875
1627	Œnothera xylocarpa Coville	do	do	In gravelly soil about the northern end of the meadows. B. H. Dutcher, collector.	2,875
1628	Velæa vestita (Wats.) Coult. & Rose	Aug. 20	do		2,850
1629	Swertia perennis L.	do	Whitney Meadows, Sierra Nevada, California.	In granitic sand and gravel all about the meadows and above timber-line.	2,850
1630	Gentiana serrata holopetala Gray	do	do		2,805
1631	Gentiana amarella acuta (Mx.) Hook. f	do	do		2,850
1632	Botrychium simplex Hitchcock	do	do		2,850
1633	Gyrostachys romanzoffiana (Cham.) MacMillan	do	do		2,850
1634	Juncus balticus Willd	do	do		2,850
1635	Utricularia minor L.	do	do		2,850
1636	Juncus orthophyllus Coville	do	do		2,850
1637	Hypnum ochraceum Wils	do	Near Whitney Meadows, Sierra Nevada, California.	Along a brook leading into Whitney Meadows from the northwest.	2,900
1638	Arnica foliosa incana Gray	do	do	do	2,900
1639	Juncus orthophyllus Coville	do	do	do	2,900
1640	Hypnum aduncum kneiffii Schimp	do	do	In a pond northwest of Whitney Meadows	3,000
1641	Callitriche palustris L.	do	do	do	3,000
1642	Eleocharis acicularis (L.) R. & S	do	do	do	3,000
1643	Isoetes bolanderi Engelm	do	do		3,000
1644	Juncus nevadensis Wats	do	do		3,000
1645	Eriogonum nudum Benth	do	do	Hillside northwest of Whitney Meadows	
1646	Monardella odoratissima Benth	do	do	do	
1647	Senecio canus Hook	do	do	do	
1648	Senecio fremontii occidentalis Gray	do	do	do	
1649	Silene bernardina Wats	do	do	do	
1650	Isoetes bolanderi Engelm	do	do	In a pool northwest of Whitney Meadows	
1651	Senecio lugens Richards	do	do	do	
1652	Juncus nevadensis Wats	do	do	do	
1653	Arenaria compacta Coville	do	do	At timber-line on a divide northwest of Whitney Meadows.	
1654	Lupinus breweri Gray	do	do	do	
1655	Sambucus melanocarpa Gray	do	do	do	
1656	Eriogonum umbellatum Torr	do	do	do	
1657	Eriogonum nivale Canby	do	do	do	
1658	Antennaria dioica (L.) Gaertn	do	do	do	
1659	Bigelovia	do	do	do	
1660	Hulsea algida Gray	do	do	Above timber-line on the mountain north of Whitney Meadows.	
1661	Carex preslii Steud	do	do	do	
1662	Senecio werneriæfolius Gray	do	do	do	
1663	Primula suffrutescens Gray	do	do	do	

1664	Potentilla	do	do	do	
1665	Pentstemon davidsonii Greene	do	do	do	
1666	Oreobroma pygmæa (Gray) Howell	do	do	do	
1667	Phlox	do	do	do	
1668	Erigeron uniflorus L	do	do	do	
1669	Carex breweri Boott	do	do	do	
1670	Barbarea vulgaris R. Br	Aug. 21	Whitney Meadows, Sierra Nevada, California		
1671	Nemophila spatulata Coville	do	do		
1672	Potentilla wheeleri Wats	do	do		
1673	Juncus nevadensis Wats	do	do		
1674	Alsine longipes (Goldie) Coville	do	do		
1675	Gentiana serrata holopetala Gray	do	do		
1676	Glyceria pauciflora Presl	do	do	In mud along the edge of Whitney Creek	
1677	Deschampsia cæspitosa (L.) Beauv	do	do	In bogs in the meadows	
1678	Trisetum spicatum (L.) Richter	do	do		
1679	Agrostis tenuis Vasey	do	do		
1680	Trifolium longipes Nutt	do	do		
1681	Sporobolus depauperatus (Hook.) Scribner	do	do	In rather dry soil in the meadows	
1682	Castilleia	do	do	Always growing with, and probably parasitic upon, *Artemisia rothrockii.*	
1683	Rumex geyeri (Meisn.) Trelease	do	do		
1684	Artemisia rothrockii Gray	do	do	Abundant in the drier portions of the meadows.	
1685	Orochænactis thysanocarpha (Gray) Coville	do	do	In the woods about the meadows	
1686	Pinus flexilis James	Aug. 22	Valley of Little Cottonwood Creek, Sierra Nevada, Inyo County, California.	On a south slope	
1687	Gentiana newberryi Gray	do	Big Cottonwood Meadows, Sierra Nevada, California.	Frederick W. Koch, collector	
1688	Eriogonum corymbosum Benth	Aug. 24	East slope of the Sierra Nevada, Inyo County, California.	Along the Hockett Trail, in the valley of Little Cottonwood Creek.	
1689	Bigelovia	do	do	do	
1690	Bigelovia bolanderi Gray	do	do	do	
1691	Isoetes bolanderi Engelm	Aug. 25	Near Whitney Meadows, Sierra Nevada, California.	In a pond on the headwaters of Kern River about 6 kilometers northwest of Whitney Meadows.	
1692	Sparganium minimum Fries	do	do	do	
1693	Potamogeton heterophyllus Schreb	do	do	do	
1694	Alopecurus	do	do	do	
1695	Geum macrophyllum Willd	do	Headwaters of the North Fork Kern River, Sierra Nevada, California.	About 12 kilometers northwest of Whitney Meadows, near the trail to Mount Whitney.	
1696	Urtica breweri Wats	do	do	do	
1697	Carex tenella Schk	do	do	do	
1698	Saxifraga punctata L	do	do	do	
1699	Pyrola rotundifolia L	do	do	do	
1700	Ledum glandulosum Nutt	do	do	do	
1701	Actæa arguta Nutt	do	Along the North Fork of Kern River, Sierra Nevada, California.	About 12 kilometers northwest of Whitney Meadows.	
1702	Mitella pentandra Hook	do	do	do	
1703	Botrychium simplex Hitchcock	do	do	do	
1704	Gentiana amarella acuta (Mx.) Hook. f	do	do	do	
1705	Saxifraga integrifolia sierræ Coville	do	do	do	
1706	Carex tolmiei subsessilis Bailey	do	do	do	
1707	Juncoides parviflorum (Ehrh.) Coville	do	do	do	
1708	Senecio aureus L	do	do	do	

Catalogue of specimens—Continued.

No.	Name.	Date.	Locality.	Remarks.	Altitude.
		1891.			*Meters.*
1709	Artemisia	Aug. 25	Along the North Fork of Kern River, Sierra Nevada, California.	About 12 kilometers northwest of Whitney Meadows.	
1710	Lonicera cærulea L	do	do	do	
1711	Ribes oxyacanthoides saxosum (Hook.) Coville	do	do	do	
1712	Fragaria vesca L	do	do	do	
1713	Gyrostachys romanzoffiana (Cham.) MacMillan	do	do	do ...... Vernon Bailey, collector	
1714	Carduus drummondii acaulescens (Gray) Coville	do	do	do	
1715	Juncus balticus Willd	do	do	do	
1716	Plagiobothrys torreyi Gray	do	do	do	
1717	Juncus nevadensis Wats	do	do	do ...... Vernon Bailey, collector	
1718	Juncus parryi Engelm	do	do	do	
1719	Marilaunidium rothrockii (Gray) Kuntze	do	do		
1720	Rosa californica Cham. & Schlecht	do	do		
1721	Juncus nevadensis Wats	Aug. 26	Near Whitney Meadows, Sierra Nevada, California.	Margin of a pond in the hillsides about 3 kilometers southwest from the meadows.	
1722	Isoetes bolanderi Engelm	do	do	do	
1723	Erigeron canadensis L	Aug. 28	Near Kern River Lakes, Sierra Nevada, California.	On the east shore of the smaller lake	
1724	Bigelovia graveolens (Nutt.) Gray	do	do	Along the west shore of the smaller lake	
1725	Utricularia vulgaris L	do	The smaller Kern River Lake, Sierra Nevada, California.		
1726	Brasenia purpurea (Mx.) Casp	do	do		
1727	Juncus nevadensis Wats	do	Along Whitney Creek, Sierra Nevada, California	About 3 kilometers northeast of Soda Springs	
1728	Aplopappus bloomeri Gray	do	do	Between Soda Springs and Whitney Meadows	
1729	Phoradendron juniperinum libocedri Engelm	Aug. 29	Valley of Kern River, Sierra Nevada, California.	Between Trout Meadows and Kern River. On *Libocedrus decurrens.*	
1730	Gomphocarpus cordifolius (Benth.) Gray	do	Near Trout Meadows, Sierra Nevada, California.	Between Trout Meadows and Farewell Gap	
1731	Juncus nevadensis Wats	do	Lyon Meadow, Sierra Nevada, California		
1732	Gentiana serrata holopetala Gray	do	do		
1733	Parnassia californica (Gray) Greene	do	do		
1734	Juncus xiphioides Mey	Aug. 28	The smaller Kern River Lake, Sierra Nevada, California.	In water along the west shore of the lake	
1735	Solidago occidentalis (Nutt.) Torr & Gr	do	Near the smaller Kern River Lake, Sierra Nevada, California.	On the east shore of the lake	
1736	Scirpus lacustris occidentalis Wats	do	do	Abundant in the lake	
1737	Galium trifidum L	Aug. 30	Lyon Meadow, Sierra Nevada, California		
1738	Ceanothus pinetorum Coville	do	Near Lyon Meadow, Sierra Nevada, California.	In forests of *Pinus jeffreyi*	
1739	Razoumofskya occidentalis (Engelm.) Kuntze	do	do	In forests of *Pinus jeffreyi*. On *Abies concolor*	
1740	Carduus andersonii (Gray) Greene	do	Near Farewell Gap, Sierra Nevada, California	Between Trout Meadows and Farewell Gap	
1741	Ptiloria tenuifolia (Torr.) Raf	do	do	do	
1742	Aster integrifolius Nutt	do	do	do	
1743	Calochortus nuttallii Torr. & Gr	do	do	On the east slope of the pass	
1744	Gentiana calycosa Griseb	do	do	do	

1745	Aplopappus whitneyi Gray	do	do	do	
1746	Lupinus covillei Greene	do	do	do	
1747	Arabis lemmoni Wats	do	Farewell Gap, Sierra Nevada, California	Summit of the pass	
1748	Crepis nana Richards	do	do	do	
1749	Epilobium obcordatum Gray	do	do	do	
1750	Potentilla plattensis Nutt	do	do	West slope of the pass	
1751	Arctostaphylos manzanita Parry	Aug. 31	Valley of Kaweah River, California		
1752	Tumion californicum (Torr.) Greene	do	do	In Big Tree Cañon	
1753	Bigelovia arborescens Gray	do	do	Above Kane Flat	
1754	Juncus dubius Engelm	Aug. 31	do	In Lake Cañon	
1755	Carduus ochrocentrus (Gray) Greene	June 8	Wood Cañon, Grapevine Mountain, California		
1756	Gilia pungens squarrosa Gray	do	do		
1757	Acor glabrum Torr	do	do		
1758	Basilima millefolium (Torr.) Greene	do	do		
1759	Pentstemon glaber Pursh	June 9	do		
1760	Lathyrus paluster L	do	do		
1761	Sambucus glauca Nutt	do	do		
1762	Eriogonum ovalifolium Nutt	do	do		
1763	Potentilla rivalis millegrana (Engelm.) Wats	do	do		
1764	Arenaria congesta subcongesta Wats	do	do		
1765	Streptanthus cordatus Nutt	do	do		
1766	Rosa californica Cham. & Schlect	June 10	Grapevine Mountains, Inyo County, California		
1767	Pinus flexilis James	June 12	Grapevine Peak, Inyo County, California	Summit of the peak	
1768	Mimulus rubellus Gray	do	do	do	
1769	Rumex crispus L	June 18	Owens River Valley, Inyo County, California		
1770	Erigeron divergens Torr. & Gr	do	do		
1771	Ranunculus cymbalaria Pursh	do	do		
1772	Stachys albens Gray	do	do		
1773	Epilobium glaberrimum Barbey	do	do		
1774	Juncus phæocephalus paniculatus Engelm	do	do		
1775	Piptocalyx circumscissus (Hook. & Arn.) Torr	do	do		
1776	Linanthus aureus (Nutt.) Greene	do	do		
1777	Œnothera californica Wats	do	do		
1778	Aquilegia truncata Fisch. & Mey	June 24	Inyo Mountains, Inyo County, California	West slope of the mountains	
1779	Lewisia rediviva Pursh	June 25	do	On the crest of the mountains	
1780	Astragalus calycosus Wats	do	do	do	
1781	Townsendia scapigera Eaton	do	do	do	
1782	Abronia nana Wats	do	do	do	
1783	Pentstemon	June 26	do	East slope of the mountains	
1784	Stachys albens Gray	June 27	do	do	
1785	Mimulus cardinalis Lindl	do	do	do	
1786	Eriogonum umbellatum Torr	July 1	Waucoba Cañon, Inyo Mountains, California		
1787	Gilia congesta Hook	July 2	do	At the head of the cañon	
1788	Linum lewisii Pursh	do	do	Near the head of the cañon	
1789	Phacelia magellanica (Lam.) Coville	do	do	do	
1790	Gilia nuttallii Gray	do	do	do	
1791	Ranunculus cymbalaria Pursh	July 7	Black Cañon, White Mountains, California		
1792	Mimulus mephiticus Greene	do	do		
1793	Pentstemon acuminatus Lindl	do	do		
1794	Eriogonum cæspitosum Nutt	do	do		
1795	Iris missouriensis Nutt	do	do		
1796	Gilia nudicaulis (Hook. & Arn.) Gray	July 8	do	At the head of the cañon	

Catalogue of specimens—Continued.

No.	Name.	Date.	Locality.	Remarks.	Altitude.
		1891.			*Meters.*
1797	Gayophytum ramosissimum Torr. & Gr	July 8	Black Cañon, White Mountains, California	At the head of the cañon	
1798	Mimulus leptaleus Gray.	do	do	do	
1799	Oreobroma pygmæa (Gray) Howell	do	do	do	
1800	Potentilla	do	do	do	
1801	Phlox cæspitosa Nutt	do	do	do	
1802	Navarretia breweri (Gray) Greene	July 9	do	do	
1803	Lupinus	do	do	do	
1804	Rumex geyeri (Meisn.) Trelease	do	do	do	
1805	Alsine baicalensis Coville	July 12	Cottonwood Creek, White Mountains, California.		
1806	Thalictrum alpinum L.	do	do		
1807	Arabis hirsuta (L.) Scop	do	do		
1808	Veronica americana Benth	do	do		
1809	Draba glacialis Adams	July 13	do		
1810	Pentstemon confertus procerus (Graham) Coville	do	do		
1811	Lappula diffusa (Lehm.) Greene	do	do		
1812	Dodocatheon jeffreyi Moore	July 12	do		
1813	Trifolium microcephalum Pursh	July 20	Near Benton, Mono County, California	On the foothills of the Sierra Nevada	
1814	Collomia linearis Nutt	do	do	do	
1815	Allium bisceptrum Wats	July 22	Mammoth, Mono County, California	Eastern foothills of the Sierra Nevada	
1816	Veronica serpyllifolia L	do	do	do	
1817	Delphinium pauciflorum depauperatum (Nutt.) Gray.	do	do	do	
1818	Triteleia ixioides (Ait. f.) Greene	do	do	do	
1819	Lilium pardalinum Kellogg	do	do	do	
1820	Collinsia torreyi Gray	do	do	do	
1821	Gilia aggregata (Pursh) Spreng	do	do	do	
1822	Habenaria leucostachys (Lindl.) Wats	do	do	do	
1823	Epilobium adenocaulon occidentale Trelease	do	do	do	
1824	Phacelia	do	do	do	
1825	Ptilocalais nutans (Hook.) Greene	July 23	do	do	
1826	Collomia grandiflora Lindl	do	do	do	
1827	Spraguea umbellata Torr	July 24	do	do	
1828	Mimulus lewisii Pursh	do	do	do	
1829	Bryanthus breweri Gray	July 25	Pine City, Mono County, California	Eastern slope of the Sierra Nevada	
1830	Phlox douglasii Hook	do	do	do	
1831	Viola blanda Willd	do	do	do	
1832	Pentstemon newberryi Gray	July 26	Near Pine City, Mono County, California	do	
1833	Streptanthus tortuosus Kellogg	do	do		
1834	Geranium richardsonii Fisch. & Traut	July 28	Along San Joaquin River, Fresno County, California.		
1835	Pedicularis attolens Gray	do	do		
1836	Potentilla douglasii Greene	do	do		
1837	Madia corymbosa (DC.) Greene.	July 29	Granite Creek, Fresno County, California		

1838	Lotus nevadensis (Wats.) Greene	do	do		
1839	Orthocarpus lacerus Benth	do	do		
1840	Erythræa venusta Gray	do	do		
1841	Azalea occidentalis Hook	do	do		
1842	Rubus parviflorus Nutt	do	do		
1843	Sarcodes sanguinea Torr	July 31	Valley of Merced River, Fresno County, California.		
1844	Lilium parvum Kellogg	Aug. 2	South Fork of the Merced River, Fresno County, California.		
1845	Delphinium scopulorum subalpinum Gray	Aug. 3	do		
1846	Eulophus parishii Coult. & Rose	do	do		
1847	Hypericum formosum scouleri (Hook.) Coult	do	do		
1848	Lotus torreyi (Gray) Greene	do	do		
1849	Prunella vulgaris L	Aug. 8	Yosemite Valley, Mariposa County, California.		
1850	Œnothera grandiflora Ait	do	do		
1851	Lotus americanus (Nutt.) Bischof	do	do		
1852	Mentha canadensis L	do	do		
1853	Boykinia major Gray	Aug. 9	Near Yosemite Valley, Mariposa County, California.		
1854	Campanula prenanthoides Durand	do	do		
855	Mimulus cardinalis Lindl	do	do		
1856	Mimulus lewisii Pursh	do	do		
1857	Sequoia gigantea (Lindl.) Decne	Aug. 13	Mariposa Grove, Mariposa County, California.		
1858	Collinsia bicolor Lindl	Aug. 20	Valley of Kings River, Fresno County, California.		
1859	Viola canina adunca (Smith) Gray	do	do		
1860	Pinus albicaulis Engelm	Aug. 21	Kearsarge Pass, Sierra Nevada, California		
1861	Pinus balfouriana Jeffr	do	do		
1862	Pinus attenuata Lemmon		Near Yosemite Valley, California	Given by a gentleman to E. S. Nelson.	
1863	Pinus jeffreyi Balfour	July —	East slope of the Sierra Nevada, Fresno County, California.	Near the head of Owens River	
1864	Pinus murrayana Balfour	do	do	do	
1865	Pinus monticola Lamb	do	do	do	
1866	Abies concolor (Gordon) Parry	do	do	do	
1867	Abies magnifica Murr	do	do	do	
1868	Tsuga pattoniana concolor (Gordon) Parry	do	do	do	
1869	Orthocarpus purpurascens palmeri Gray	Apr. 25	At Leach Point Spring, Inyo County, California.	Vernon Bailey, collector	
1870	Linanthus dichotomus Benth	do	do	do	
1871	Marilaunidium demissum (Gray) Gray	do	do	do	
1872	Salix lævigata Bebb	do	At Lone Willow Spring, Inyo County, California.	do	
1873	Brodiæa capitata Benth	do	At Leach Point Spring, Inyo County, California.	do	1,050
1874	Krameria parvifolia Benth	Apr. 27	Resting Springs Valley, Inyo County, California.	do	550
1875	Nitrophila occidentalis (Moq.) Wats	do	At Saratoga Springs, Death Valley, California.	do	100
1876	Lupinus pusillus Pursh	Apr. 30	At Cottonwood Springs, Vegas Valley, Nevada.	do	1,050
1877	Calochortus flexuosus Wats	do	do	do	1,050
1878	Garrya veatchii flavescens (Wats.) Coult. & Evans.	do	At Mountain Springs, Charleston Mountains, Nevada.	do	1,680
1879	Arctostaphylos pungens H. B. K	do	do	do	1,680

Catalogue of specimens—Continued.

No.	Name.	Date.	Locality.	Remarks.	Altitude.
		1891.			*Meters.*
1880	Forsellesia spinescens (Gray) Greene	Apr. 30	At Mountain Spring, Charleston Mountains, Nevada.	Vernon Bailey, collector	1, 6080
1881	Prunus fasciculata (Torr.) Walp	do	do	do	1, 680
1882	Physaria newberryi Gray	do	do	do	1, 680
1883	Cercis occidentalis Gray	do	Near Mountain Spring, Charleston Mountains, Nevada.	do	1, 680
1884	Amsonia	do	At Cottonwood Spring, Vegas Valley, Nevada.	do	1, 680
1885	Amsonia	do	do	do	1, 050
1886	Abronia fragrans Nutt.	do	do	do	1, 050
1887	Navarretia setosissima Torr. & Gr	May 1	Vegas Valley, Lincoln County, Nevada	do	750
1888	Oreocarya glomerata (Pursh) Greene	do	do	do	750
1889	Arctomecon californicum Torr. & Frem	do	do	do	750
1890	Arctomecon merriami Coville	do	do	do	750
1891	Opuntia echinocarpa Engelm. & Bigel	do	Near Cottonwood Springs, Vegas Valley, Nevada.	do	1, 050
1892	Mentzelia tricuspis Gray	May 2	Vegas Wash, Lincoln County, Nevada	do	350
1893	Phacelia lemmoni Gray	do	do	do	350
1894	Dalea mollis Benth	do	do	do	350
1895	Echinocactus johnsoni Engelm	do	do	do	350
1896	Gilia floccosa Gray	May 4	Banks of the Colorado River, Lincoln County, Nevada.	Vernon Bailey, collector. Near the Vegas Wash.	250
1897	Coldenia plicata (Torr.) Coville	do	do	do	250
1898	Coldenia hispidissima (Torr.) Gray	do	do	do	250
1899	Baccharis glutinosa Pers	do	do	do	250
1900	Navarretia schottii Torr	do	do	do	250
1901	Petalonyx parryi Gray	May 2	Vegas Wash, Lincoln County, Nevada	Vernon Bailey, collector. On the gypsum cliffs.	350
1902	Pentstemon palmeri Gray	May 5	Near Callville, Lincoln County, Nevada	Vernon Bailey, collector. In a dry wash	275
1903	Chilopsis linearis (Cav.) DC	do	do	do	275
1904	Scirpus americanus Pers	May 6	Valley of the Virgin River, Utah	Vernon Bailey, collector. Below St. George.	
1905	Hordeum	do	Valley of the Virgin River, Lincoln County, Nevada.	Vernon Bailey, collector. Below St. Thomas	
1906	Sieglingia pulchella (H. B. K.) Kuntze	do	do	do	
1907	Trisetum barbatum Steud	do	do	do	
1908	Mentzelia tricuspis Gray	do	do	do	
1909	Chorizanthe rigida (Torr.) Torr. & Gr	do	do	do	
1910	Astragalus virgineus Sheldon	do	do	do	
1911	Encelia eriocephala Gray	do	do	do	
1912	Plantago patagonica gnaphaloides (Nutt.) Gray	do	do	do	
1913	Cressa cretica truxillensis (H. B. K) Choisy	do	do	do	
1914	Stylocline micropoides Gray	do	do	do	
1915	Eriophyllum lanosum Gray	do	do	do	
1916	Atrichoseris platyphylla Gray	do	do	do	
1917	Gilia polycladon Torr	do	do	do	
1918	Croton	do	do	do	

1919	Eriogonum trichopes Torr.	do	do	do	
1920	Chænactis carphoclinia Gray	do	do	do	
1921	Allenrolfea occidentalis (Wats.) Kuntze	do	do	do	
1922	Hordeum jubatum L.	do	do	do	
1923	Trisetum barbatum Steud	do	do	do	
1924	Phalaris intermedia angusta (Nees) Chapm.	do	do	do	
1925	Sphæralcea	do	do	do	
1926	Krameria canescens Gray	do	do	do	
1927	Heliotropium curassavicum L.	do	Near St. Thomas, Lincoln County, Nevada	Vernon Bailey, collector	
1928	Lycium torreyi Gray	do	do	do	
1929	Aster canescens tephrodes Gray	do	do	do	
1930	Psoralea castorea Wats.	May 7	Valley of the Virgin River, Lincoln County, Nevada.	Vernon Bailey, collector. Above St. Thomas.	
1931	Thamnosma montana Torr. & Frem.	do	do	do	
1932	Selinocarpus diffusus Gray	do	At Overton, Lincoln County, Nevada	Vernon Bailey collector	
1933	Mortonia scabrella Gray	do	do	do	
1934	Amphiachyris fremontii Gray	May 9	At Bunkerville, Lincoln County, Nevada	do	
1935	Coldenia canescens DC	do	do	Vernon Bailey, collector. On limestone hills	
1936	Bigelovia graveolens (Nutt.) Gray	do	At Beaverdam, Mohave County, Arizona	Vernon Bailey, collector. In the bottom lands of the Virgin River.	
1937	Mirabilis multiflora (Torr.) Gray	do	do	Vernon Bailey, collector	
1938	Franseria eriocentra Gray	do	do	Vernon Bailey, collector, bottom land of a creek	
1939	Opuntia rutila Nutt.	May 10	Beaverdam Mountains, Utah	Vernon Bailey, collector	
1940	Echinocactus johnsoni Engelm.	do	do	do	
1941	Opuntia rutila Nutt.	May 7	Near St. Joe, Lincoln County, Nevada	Vernon Bailey, collector. On a mesa between St. Joe and Bunkerville.	
1942	Opuntia	May 9			
1943	Opuntia acanthocarpa Engelm. & Bigel.	May 10	Beaverdam Mountains, Utah	Vernon Bailey, collector	
1944	Phlox austromontana Coville	do	do	do	
1945	Comandra pallida A. DC	do	do	do	
1946	Kunzia tridentata (Pursh) Spreng.	May 11	do	do	
1947	Kunzia glandulosa (Curran) Greene	do	do	do	
1948	Fraxinus anomola Wats.	do	do	do	
1949	Tetradymia spinosa Hook. & Arn	do	do	do	
1950	Lycium andersonii Gray	do	do	do	
1951	Lycium pallidum Miers	do	do	do	
1952	Lycium torreyi Gray	do	At St. George, Washington County, Utah	do	875
1953	Dalea johnsoni Wats.	do	do	do	875
1954	Yucca radiosa (Engelm.) Trelease	May 14	do	do	875
1955	Cereus engelmanii Engelm	do	do	do	875
1956	Mirabilis lævis (Benth.) Curran	do	do	do	875
1957	Abronia	do	do	do	875
1958	Artemisia filifolia Torr.	do	do	do	875
2 39	Opuntia rutila Nutt.	do	do	do	875
2042	Opuntia echinocarpa Engelm. & Bigel.	do	do	do	875
2043 2044	Astragalus	May 16	Near St. George, Washington County, Utah	Vernon Bailey, collector. Twelve kilometers west of St. George.	
2045	M scutella wislizeni (Engelm.) Wats.	do	do	Vernon Bailey, collector. Thirty kilometers west of St. George.	
2046	Ph ierrezia	do	do	do	
	aphyllum ramosissimum Nutt.	May 17	Mountain Meadows	Vernon Bailey, collector	
	ragalus oöphorus Wats.	May 18	Terry's ranch, Shoal Creek, Utah	do	

Catalogue of specimens—Continued.

No.		Name.	Date.	Locality.	Remarks.	Altitude.
			1891.			*Meters.*
	56	Dodecatheon	May 18	Terry's ranch, Shoal Creek, Utah	Vernon Bailey, collector	
1880	1967	Lewisia rediviva Pursh	do	do	do	
	1968	Phlox cæspitosa Nutt	do	Near Panaca, Lincoln County, Nevada	Vernon Bailey, collector. Thirty kilometers east of Panaca.	
	1969	Phlox longifolia stansburyii (Torr.) Gray	do	do	do	
	1970	Erigeron concinnus (Hook. & Arn.) Torr. & Gr.	do	do	do	
	1971	Gilia	do	do	do	
	1972	Allium anceps Kellogg	do	do	do	
	1973	Gilia congesta Hook	do	do	do	
	1974	Cymopterus longipes Wats	do	do	do	
	1975	Astragalus obscurus Wats	do	do	do	
	1976	Leucocrinum montanum Nutt	do	do	do	
	1977	Balsamorhiza hirsuta Nutt	do	do	Vernon Bailey, collector. About 30 kilometers east of Panaca.	
	1978	Tetradymia glabrata Gray	May 19	do	Vernon Bailey, collector. About 12 kilometers east of Panaca.	
	1979	Opuntia whipplei Engelm. & Bigel	May 16	Along Santa Clara Creek, Washington County, Utah.	Vernon Bailey, collector	
	1980	Opuntia whipplei Engelm. & Bigel	do	do	do	
	1981	Opuntia missouriensis DC	May 18	Near Panaca, Lincoln County, Nevada	Vernon Bailey, collector. About 30 kilometers east of Panaca.	
	1982	Mamillaria deserti Wats.	do	do	do	
	1983	Yucca glauca Nutt	May 19	do	Vernon Bailey, collector. About 15 kilometers east of Panaca, in the Mormon Mountains.	
	1984	Œnothera hartwegi lavandulæfolia (Torr. & Gr.) Wats.	May 20	do	do	
	1985	Salvia carnosa Dougl	do	do	Vernon Bailey, collector. About 30 kilometers west of Panaca.	
	1986	Forsellesia nevadensis (Gray) Greene	May 21	At Pahroc Spring, Lincoln County, Nevada	Vernon Bailey, collector	
	1987	Symphoricarpos longiflorus Gray	do	do	do	
	1988	Eurotia lanata (Pursh) Moq	May 27	At Quartz Spring, Lincoln County, Nevada	do	
	1989	Opuntia rutila Nutt	do	do	do	
	1990	Yucca baccata Torr	do	do	do	
	1991	Opuntia whipplei Engelm. & Bigel	do	Near Panaca, Lincoln County, Nevada	Vernon Bailey, collector. About 15 kilometers east of Panaca.	
	1992	Juniperus californica utahensis Engelm	do	do	do	
	1993	Opuntia echinocarpa Engelm. & Bigel	May 22	Sarcobatus Flat, Ralston Desert, Nevada	Vernon Bailey, collector	1,350
	1994	Sarcobatus baileyi Coville	June 2	do	do	1,350
	1995	Gilia floccosa Gray	do	do	do	1,350
	1996	Mirabilis lævis (Benth.) Curran	do	do	do	1,350
	1997	Œnothera scapoidea purpurascens Wats	do	do	do	1,350
	1998	Ptiloria pentachæta (Eaton) Greene	do	do	do	1,350
	1999	Glyptopleura setulosa Gray	do	do	do	1,350
	2000	Eriophyllum pringlei Gray	do	do	do	1,350

2001	Tetradymia glabrata Gray	...do	......do	......do	1,350
2002	Aplopappus monactis Gray	...do	Gold Mountain, Esmeralda County, Nevada	......do	....
2003	Ribes leptanthum brachyanthum Gray	June 3	......do	......do	....
2004	Bigelovia teretifolia (Dur. & Hilg.) Gray	...do	......do	......do	....
2005	Lycium cooperi Gray	...do	......do	......do	....
2006	Calochortus kennedyi Porter	June 4	Below Tule Cañon, Esmeralda County, Nevada	......do	....
2007	Tetradymia canescens DC	June 5	Mount Magruder, Esmeralda County, Nevada	......do	....
2008	Peucedanum villosum Wats	...do	......do	......do	....
2009	Opuntia pulchella Engelm	June 8	Fish Lake Valley, Esmeralda County, Nevada	......do	....
2010	Echinocactus polyancistrus Engelm. & Bigel	...do	......do	......do	....
2011	Sarcobatus baileyi Coville	...do	......do	......do	....
2012	Atriplex confertifolia (Torr. & Frem.) Wats	...do	At Pigeon Spring, Esmeralda County, Nevada	......do	2,000
2013	Opuntia rutila Nutt	June 9	White Mountains, Mono County, California	......do	....
2014	Opuntia rutila Nutt	...do	......do	......do	....
2015	Jamesia americana Torr. & Gr	June 22	Death Valley Cañon, Panamint Mountains, California.	......do	....
2016	Holodiscus discolor (Pursh) Maxim	...do	......do	......do	....
2017	Fraxinus pistaciæfolia Torr	...do	......do	......do	....
2018	Acer glabrum Torr	...do	......do	......do	....
2019	Cercocarpus intricatus Wats	...do	......do	......do	....
2020	Œnothera	June 23	Telescope Peak, Panamint Mountains, California.	Vernon Bailey, collector. North base of the peak.	....
2021	Mimulus rubellus Gray	...do	......do	......do	....
2022	Astragalus beckwithii Torr. & Gr	...do	......do	......do	....
2023	Ribes cereum Dougl	...do	......do	......do	....
2024	Bigelovia	...do	......do	......do	....
2025	Lesquerella kingii Wats	...do	......do	......do	....
2026	Erigeron	...do	......do	......do	....
2027	Phlox longifolia stansburyi (Torr.) Gray	...do	......do	......do	....
2028	Pellæa breweri Eaton	...do	......do	......do	....
2029	Calyptridium roseum Wats	...do	......do	......do	....
2030	Holodiscus discolor (Pursh) Maxim	...do	......do	......do	....
2031	Ribes	...do	......do	......do	....
2032	Brodiæa capitata Benth	...do	......do	......do	....
2033	Lupinus holosericeus Nutt	...do	......do	......do	....
2034	Bigelovia	...do	......do	Vernon Bailey, collector. Summit of the peak	3,333
2035	Heuchera rubescens Torr	...do	......do	......do	3,333
2036	Eriogonum	...do	......do	......do	3,333
2037	Œnothera	...do	......do	......do	3,333
2038	Basilima millefolium (Torr.) Greene	...do	......do	......do	3,333
2039	Ribes cereum Dougl	...do	......do	......do	3,333
2040	Lupinus	June 24	Above the charcoal kilns, Panamint Mountains, California.	Vernon Bailey, collector	2,300
2041	Phlox longifolia stansburyi (Torr.) Gray	...do	......do	......do	2,300
2042	Lupinus holosericeus Nutt	...do	......do	......do	2,300
2043	Castilleia	...do	......do	......do	2,300
2044	Pentstemon fruticiformis Coville	...do	Wild Rose Cañon, Panamint Mountains, California.	......do	....
2045	Monardella linoides Gray	...do	......do	......do	....
2046	Pholisma arenarium Nutt	July 1	Walker Pass, Sierra Nevada, California	......do	....

Catalogue of specimens—Continued.

No.	Name.	Date.	Locality.	Remarks.	Altitude.
		1891.			*Meters.*
2047	Potentilla glandulosa nevadensis Wats	Sept. 1	Near Mount Whitney, Sierra Nevada, California.	Vernon Bailey, collector. Headwaters of the North Fork of Kern River at timber-line.	
2048	Carex preslii Steud	do	do	do	
2049	Pentstemon confertus procerus (Graham) Coville	do	do	do	
2050	Trisetum	do	do	do	
2051	Draba subsessilis Wats	do	do	do	
2052	Senecio werneriæfolius Gray	do	do	do	
2053	Cryptanthe	do	do	do	
2054	Bigelovia	do	do	do	
2055	Epilobium obcordatum Gray	do	do	Vernon Bailey, collector. About 50 meters above timber-line.	
2056	Ribes cereum Dougl	do	do	Vernon Bailey, collector. From 200 meters below to 350 meters above timber-line.	
2057	Tanacetum canum Eaton	do	do	Vernon Bailey, collector. From 200 to 300 meters above timber-line.	
2058	Hulsea algida Gray	do	Mount Whitney, Sierra Nevada, California	Vernon Bailey, collector. Growing from 300 to 900 meters above timber-line.	
2059	Bigelovia	do	Near Mount Whitney, Sierra Nevada, California.	Vernon Bailey, collector. Occurs up to 325 meters above timber-line.	
2060	Erigeron trifidus Hook	do	Mount Whitney, Sierra Nevada, California	Vernon Bailey, collector. Occurs up to 400 meters above timber-line.	
2061	Polemonium confertum Gray	do	Near Mount Whitney, Sierra Nevada, California.	Vernon Bailey, collector. From 275 to 575 meters above timber-line.	
2062	Erigeron compositus Pursh	Sept. 2	do	Vernon Bailey, collector. At 300 meters above timber-line.	
2063	Trisetum spicatum (L.) Richter	do	do	Vernon Bailey, collector. Up to 450 meters above timber-line.	
2064	Potentilla	do	do	do	
2065	Festuca ovina brevifolia (R. Br.) Wats	do	do	Vernon Bailey, collector. Upper limit at 500 meters above timber-line.	
2066	Poa	do	do	do	
2067	Carex incurva Lightf	do	do	do	
2068	Oreobroma pygmæa (Gray) Howell	do	do	do	
2069	Draba lemmoni Wats	do	do	do	
2070	Spraguea umbellata Torr	do	do	Vernon Bailey, collector. Up to 510 meters above timber-line.	
2071	Selaginella rupestris (L.) Spring	do	do	do	
2072	Phlox cæspitosa Nutt	do	do	do	
2073	Carex atrata L	do	do	Vernon Bailey, collector. Upper limit 640 meters above timber-line.	
2074	Gentiana amarella acuta (Mx.) Hook. f	Sept. 6	Soda Springs, Sierra Nevada, California	Vernon Bailey, collector	2,150
2075	Azolla caroliniana Willd	Sept. 15	At Three Rivers, Tulare County, California	do	

2076	Pinus albicaulis Engelm	Sept. 2	Near Mount Whitney, Sierra Nevada, California.	Vernon Bailey, collector. Occurs from timber-line down 210 meters.	
2077	Pinus albicaulis Engelm	do	do	Vernon Bailey, collector. Ranging 30 meters above *P. balfouriana.*	
2078	Orthotrichum	do	do	Vernon Bailey, collector. At 600 meters above timber-line.	
2079	Orthotrichum	do	do	do	
2080	Juncus subtriflorus (Mey.) Coville	Aug. 8	Near Mineral King, Tulare County, California.	On the slope leading to Farewell Gap	
2081	Œnothera cæspitosa Nutt	Apr. 4	Johnson Cañon, Panamint Mountains, California.	Near Pete's garden	
2082	Arabis arcuata (Nutt.) Gray	May 19	Near Willow Creek, Panamint Mountains, California.	On the south slope of the hillside north of Willow Creek camp.	
2083	Uromyces œnotheræ Burr. II	Apr. 21	Surprise Cañon, Panamint Mountains, California.	On *Œnothera cardiophylla*	
2084	Æcidium gayophyti Vizé	July 8	Black Cañon, White Mountains, Mono County, California.	On *Gayophytum ramosissimum*	
2085	Pinus jeffreyi Murr	July 14	Sierra Nevada, Kern County, California	Mountains north of Walker Basin, Kern County, California. A. K. Fisher, collector.	
2086	Juniperus occidentalis Hook	Aug. 11	Sierra Nevada, Fresno County, California	Horse Corral Meadows. T. S. Palmer, collector.	
2087	Tsuga pattoniana (Jeffr.) Engelm	Aug. 17	do	Near the head of Bubbs Creek, south fork of Kings River. T. S. Palmer, collector.	
2088	Pentstemon newberryi Gray	Aug. 7	Mount Silliman, Sierra Nevada, California	T. S. Palmer, collector	3, 200
2089	Bryanthus breweri Gray	do	do	do	3, 200
2090	Phlox douglasii Hook	do	do	do	3, 200
2091	Spraguea umbellata Torr	do	do	do	3, 200
2092	Eriogonum incanum Torr. & Gr	do	do	do	3, 200
2093	Heuchera rubescens Torr	do	do	do	3, 200
2094	Rumex geyeri (Meisn.) Trelease	do	do	do	3, 200
2095	Juncus nevadensis Wats	Aug. 8	Halsted Meadows, Sequoia Park, California	do	2, 150
2096	Habenaria leucostachys (Lindl). Wats	do	do	do	2, 150
2097	Mimulus moschatus longiflorus Gray	do	do	do	2, 150
2098	Helenium bigelovii Gray	do	do	do	2, 150
2099	Lotus torreyi (Gray) Greene	do	do	do	2, 150
2100	Pyrola picta Smith	do	do	do	2, 150
2101	Sarcodes sanguinea Torr	do	do	do	2, 150
2102	Geranium richardsonii Fisch. & Traut	do	do	do	2, 150
2103	Sidalcea spicata (Regel) Greene	do	do	do	2, 150
2104	Quercus chrysolepis Liebm	Aug. 15	Kings River Cañon, Sierra Nevada, California.	do	
2105	Quercus californica (Torr.) Cooper	do	do	do	
2106	Populus trichocarpa Torr. & Gr	do	do	do	
2107	Quercus californica (Torr.) Cooper	Aug. 18	Near Independence, Inyo County California	T. S. Palmer, collector. At the base of the Sierra Nevada.	
2108	Phleospora bigeloviæ Ellis	July 12	Near Tejon Pass, Kern County, California	On *Bigelovia*, No. 1225	
2109	Erigeron divergens Torr. & Gr	June 7	Near Lone Pine, Inyo County, California	Margin of the swamp on the Harvey ranch	
2110	Piptocalyx dichotomus Greene	Aug. 4	Big Cottonwood Meadows, Sierra Nevada, California.	F. W. Koch, collector	3, 050
2111	Mimulus luteus alpinus Gray	Aug. 21	do	do	3, 050
2112	Erigeron coulteri Porter	do	do	do	3, 050
2113	Tellima tenella (Nutt.) Walp	July 11	do	Near Dutcher's camp. F. W. Koch, collector	3, 050
2114	Aster andersonii Gray	July 10	do	do	3, 050

Catalogue of specimens—Continued.

No.	Name.	Date.	Locality.	Remarks.	Altitude.
		1891.			*Meters.*
2115	Viola canina adunca (Smith) Gray	July 9	Big Cottonwood Meadows, Sierra Nevada, California.	Near Dutcher's camp. F. W. Koch, collector	3,050
2116	Mimulus luteus alpinus Gray	July 7	do	do	3,050
2117	Potentilla breweri Wats	July 12	Near Big Cottonwood Meadows, Sierra Nevada, California.	do	3,065
2118	Arabis hirsuta (L.) Scop	July 6	Sierra Nevada, Inyo County, California	do	3,050
2119	Arenaria compacta Coville	July 12	do	do	3,200
2120	Dodecatheon	July 7	do	do	3,050
2121	Hemizonia wheeleri Gray	July 5	Big Cottonwood Meadows, Sierra Nevada, California.	do	3,050
2122	Claytonia chamissoi Ledeb	July 20	Near Big Cottonwood Meadows, Sierra Nevada, California.	do	3,200
2123	Ranunculus alismæfolius alismellus Gray	July 12	Big Cottonwood Meadows, Sierra Nevada, Inyo County, California.	do	3,050
2134	Dodecatheon jeffreyi Moore	do	do	do	
2125	Mimulus leptaleus Gray	do	do	do	3,100
2126	Potentilla santolinoides (Gray) Greene	do	do	do	3,050
2127	Cystopteris fragilis (L.) Bernh	do	do	do	3,050
2128	Delphinium scaposum Greene	July 18	do	do	3,050
2129	Veronica serpyllifolia L	do	do	do	3,050
2130	Gilia nuttallii Gray	do	do	do	3,050
2131	Sisymbrium incisum Engelm	do	do	do	3,050
2132	Erysimum asperum perenne Wats	do	do	do	3,050
2133	Aplopappus apargioides Gray	July 29	Along Big Cottonwood Creek, Sierra Nevada, California.	F. W. Koch, collector	
2134	Hemizonia wheeleri Gray	Aug. 4	do	do	
2135	Spraguea umbellata Torr	Aug. 5	Big Cottonwood Meadows, Sierra Nevada, Inyo County, California.	F. W. Koch, collector. Near Dutcher's camp	3,050
2136	Hemizonia wheeleri Gray	Aug. 4	Along Big Cottonwood Creek, Sierra Nevada, Inyo County, California.	F. W. Koch, collector	
2137	Mimulus nanus Hook. & Arn	Aug. 7	do	F. W. Koch, collector. In *Pinus jeffreyi*	
2138	Pentstemon confertus procerus (Graham) Coville	Aug. 20	Near Big Cottonwood Meadows, Sierra Nevada, California.	F. W. Koch, collector	
2139	Mimulus deflexus Wats	do	do	do	
2140	Mimulus deflexus Wats	do	do	do	
2141	Syntrichopappus fremontii Gray	June 2	Sarcobatus Flat, Ralston Desert, Nevada	Vernon Bailey, collector	
2142	Orochænactis thysanocarpha (Gray) Coville	Aug. 5	Along Big Cottonwood Creek, Sierra Nevada, California.	F. W. Koch, collector	
2143	Gilia floccosa Gray	May 15	Panamint Mountains, California.	In Mill Creek Cañon	
2144	Puccinia giliæ Hark	July 28	Valley of Kaweah River, Sierra Nevada, California.	On *Gilia virgata floribunda*	
2145	Salix nigra venulosa (Anders.) Bebb	Mar. —	Ash Meadows, Nye County, Nevada		
2146	Fraxinus coriacea Wats	do	do		
2147	Septoglœum fraxini Hark	July 26	Kaweah River Valley, Tulare County, California	On *Fraxinus oregona*	

2148	Erysiphe	Aug. 17	Soda Springs, Sierra Nevada, California	On *Frasera tubulosa*	....
2149	Puccinia menthæ Pers. ii	July 20	Near Visalia, Tulare County, California	On *Mentha canadensis*	....
2150	Cryptanthe ramosissima Greene	Mar. 25	Death Valley, Inyo County, California	Between Bonnett Wells and Johnson Cañon	....
2151	Oreocarya fulvocanescens (Wats.) Greene	June 25	Inyo Mountains, Inyo County, California	....	....
2152	Marilaunidium rothrockii (Gray) Kuntze	Aug. 7	East slope of the Sierra Nevada, Inyo County, California.	On the Hockett Trail, under *Pinus jeffreyi*	....
2153	Marilaunidium demissum (Gray) Kuntze	Mar. 21 & 22.	Funeral Mountains, Inyo County, California	Between Ash Meadows and Furnace Creek	....
2154	Adiantum emarginatum Hook	Mar. 11	Vegas Ranch, Lincoln County, Nevada	Along the irrigating ditch of the ranch house. Vernon Bailey, collector.	630
2155	Cryptomyces	Aug. 12	Between Trout Meadows and Kern River, Sierra Nevada, California.	On *Razoum·fskya occidentalis*	....
2156	Uromyces eriogoni Ell. & Hark	June 22	South Fork of Kern River, California	On *Eriogonum nudum pauciflorum*	....
2157	Mimulus floribundus Lindl	June 23	Near Kernville, Kern County, California	....	750
2158	Monardella odoratissima Benth	Aug. 4	Along Big Cottonwood Creek, Sierra Nevada, California.	F. W. Koch, collector	....
2159	Polytrichum piliferum Schreb	Aug. 7	Near Farewell Gap, Sierra Nevada, California.	Mountain slope back of the White Chief Mine	....
2160	Antennaria alpina (L.) Gaertn	do	do	do	....
2161	Tortula membranifolia Hook	Feb. 20	Funeral Mountains, Inyo County, California	Cañon of Mesquite Spring	....
2162	Bryum cæspiticium L	Aug. 7	Near Mineral King, Sierra Nevada, California.	Near the White Chief Mine	3,200
2163	Hypnum serrulatum Hedw	....	Valley of the Kaweah River, Sierra Nevada, California.	Big Tree Cañon	....
2164	Carex marcida Boott	June 7	Near Lone Pine, Inyo County, California	Swamp west of the house on the Harvey ranch	....
2165	Philonotis fontana Brid	July 3	Frazier Mountain, Ventura County, California.	By a spring near the summit of the mountain	....
2166	Hypnum aduncum hamatum Br. & Sch	Aug. 20	Near Whitney Meadows, Sierra Nevada, California.	In a little pond northwest of Whitney Meadows.	....
2167	Gayophytum	June 23	Near Kernville, Kern County, California	About 1.5 kilometers south of Kernville	750

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Eaton, Bot. King Surv. *See* **U. S. Geol. Explor.**

Eaton, Bot. Wheeler Surv. *See* **U. S. Geol. Surv.**

Eaton, Ferns N. A. EATON, D. C. Ferns of North America. v. 1. Salem, 1879. 4°.

Species referred to: *Adiantum emarginatum*.

Edinb. New Phil. Journ. Edinburgh new philosophical journal. v. 7. Edinburgh, 1829. 8°.

Species referred to: *Pentstemon confertus procerus*, as *P. procerus*.

Edinb. Phil. Journ. Edinburgh philosophical journal. v. 6. Edinburgh, 1822. 8°.

Species referred to: *Alsine longipes*, under *Stellaria*.

Ehrh. Beitr. EHRHART, FRIEDRICH. Beiträge zur naturkunde. v. 6. Hanover, 1791. 8°.

Species referred to: *Juncoides parviflorum*, under *Juncus*.

Emory, Rep. EMORY, W. H. Notes of a military reconnoissance, from Fort Leavenworth, in Missouri, to San Diego, in California, including part of the Arkansas, Del Norte, and Gila rivers. Washington, 1848. 8°.

Species referred to, 8.

Endl. Gen. Pl. ENDLICHER, S. L. Genera plantarum. Vindobonæ, 1836–40. 4°.

Species referred to: *Fallugia paradoxa*.

Engelm. Bot. Ives Exped. *See* **U. S. Explor. & Surv.**

Engelm. Bot. King Surv. *See* **U. S. Geol. Explor.**

Engelm. & Bigel. Pac. R. Rep. *See* **U. S. Pac. R. Rep.**

Engelm. & Gray. Pl. Lindh. ENGELMANN, GEORGE, and GRAY, ASA. Plantæ Lindheimerianæ; an enumeration of the plants collected in Texas by F. Lindheimer. 2 pts. (*In* Bost. Soc. Nat. Hist. Bost. Journ. Nat. Hist. v. 5, pp. 210–264; v. 6, pp. 141–233. Boston, 1845, 50.)

Pt. 1 by Engelmann and Gray; pt. 2 by Gray.

Species referred to: *Cercis occidentalis*, *Phoradendron flavescens villosum*, as *P. villosum* *Razoumofskya cryptopoda* and *R. americana*, under *Arceuthobium*, *Razoumofskya occidentalis*, as *Arceuthobium campylopodum*.

Engler, Bot. Jahrb. ENGLER, ADOLPH, hrsg. Botanische jahrbücher für systematik pflanzengeschichte und pflanzengeographie. v. 11. Leipzig, 1890. 8°.

Species referred to: *Abronia pogonantha*.

Engler & Prantl, Nat. Pfl. ENGLER, ADOLPH, and PRANTL, K. Die natürlichen pflanzenfamilien. 3 teil, 2 abt. Leipzig, 1888. 8°.

Species referred to: *Brasenia purpurea*.

Erythea. ERYTHEA, a journal of botany, west American and general; ed. by W. L. Jepson. v. 1. Berkeley, 1893. 8°.

Species referred to, 6.

***Fée, Gen. Fil.** FÉE, A. L. A. Genera Filicum; exposition des genres de la famille des Polypodiacées. (Mémoires sur la famille des Fougères. 5. Paris, 1850–52.)

Species referred to: *Pellæa andromedæfolia*.

Fisch. & Mey. Ind. Sem. Petrop. FISCHER, F. E., and MEYER, C. A. Index seminum horti botanici Petropolitani. 2, 4, 9, suppl. Petropoli, 1835, 37, 44. 8°.

The date accompanying the Censor's signature to Indices 2, 4, and 9 are respectively Dec. 1835, Dec. 1837, Jan. 1844. Of these indices, commonly attributed to Fischer and Meyer, the 8th, 9th, and 10th were issued under the joint authorship of Ave-Lallemant as well.

Species referred to: *Allocarya californica*, under *Myosotis*, *Amsinckia spectabilis*, *Aquilegia truncata*, *Geranium richardsonii*, *Pterostegia drymarioides*.

Fisch. Mey. & Lalle. Ind. Sem. Petrop. *See* **Fisch. & Mey. Ind. Sem. Petrop.**

Fisch & Traut. Ind. Sem. Petrop. *See* **Fisch. & Mey. Ind. Sem. Petrop.**

Flora. Flora; oder Botanische zeitung. Regensburg, 1821. 8°.

Species referred to: *Rumex salicifolius*.

Forst. Fl. Ins. Aust. Prodr. FORSTER, GEORG. Florulæ insularum Australium prodromus. Gottingæ, 1786. 8°.

Species referred to: *Parietaria debilis*.

***Fraser, Cat.** Catalogue of new and interesting plants, collected in upper Louisiana, and principally on the River Missourie, North America [by T. Nuttall], for sale at Messrs. Fraser's nursery for curious American plants, Sloane Square, King's Road, Chelsea, London. 1813.

Reprinted in Pittonia, v. 2, pp. 116–119.
Species referred to: *Yucca glauca*.

Frem. First Rep. FREMONT, J. C. Report on an exploration of the country lying between the Missouri River and the Rocky Mountains, on the line of the Kansas and Great Platte rivers [in the year 1842]. Washington, 1843. 8°. (27th Cong. 3d sess., Senate Ex. Doc. no. 243.)

——— ———. Reprinted. (*In* Fremont, J. C. Report of the exploring expedition to the Rocky Mountains, in the year 1842, and to Oregon and North California in the year 1843–44. Washington, 1845. (28th Cong. 2d sess., Senate Ex. Doc. no. 174; House Ex. Doc. no. 166.)

For reference see *Fremontodendron californicum*, p. 74.

Frem. Second Rep. FREMONT, J. C. Report of the exploring expedition to Oregon and North California, in the years 1843–44. (*In his* Report of the exploring expedition to the Rocky Mountains in the year 1842, etc. Washington, 1845.)

Species referred to: 11.

Fries, Epicr. Hier. FRIES, E. M. Epicrisis generis Hieraciorum. Upsaliæ, 1862. 8°. (Ex. Upsala universitets årsskrift.)

Species referred to: *Hieracium horridum*.

Fries, Summ. Veg. FRIES, E. M. Summa vegetabilium. Holmiæ, 1846–49. 8°.

Species referred to: *Sparganium minimum*.

Gaertn. Fruct. GAERTNER, JOSEPH. De fructibus et seminibus plantarum. v. 2. Tubingæ, 1791. 4°.

The second volume of a copy at the Columbia College Herbarium is dated Lipsiæ, 1802.
Species referred to: *Antennaria dioica*, *A. alpina*.

Gard. Chron. Gardeners' chronicle, 1853. London, 1853. f°.

Species referred to: *Sequoia gigantea*, under *Wellingtonia*.

Gordon, Pinetum. GORDON, GEORGE, and GLENDINNING, ROBERT. The pinetum; being a synopsis of all the coniferous plants at present known, with descriptions, history, and synonymes, and comprising nearly one hundred new kinds. London, 1858. 8°.

Species referred to: *Abies concolor*, under *Picea*.

Gray, Bot. Cal. *See* **Brewer & Wats. Bot. Cal.**

Gray, Bot. Ives Exped. *See* **U. S. Explor. & Surv.**

Gray, Bot. Mex. Bound. *See* **U. S. Mex. Bound.**

Gray, Man. Gray, Asa. Manual of the botany of the Northern United States. Boston and Cambridge, 1848. 8°.

———— Same. Ed. 2. New York, 1856. 8°.

———— Same. Ed. 5. New York, 1867. 8°.

Species referred to: *Aphyllon fasciculatum*, *Draba caroliniana micrantha*, *Ranunculus aquatilis trichophyllus*, *Scirpus olneyi*.

Gray, Pac. R. Rep. *See* **U. S. Pac. R. Rep.**

Gray, Pl. Fendl. Gray, Asa. Plantæ Fendlerianæ Novi-Mexicanæ; an account of a collection of plants made chiefly in the vicinity of Santa Fé, New Mexico, by Aug. Fendler, with descriptions of the new species, critical remarks, and characters of other undescribed or little known plants from surrounding regions. (*In* Amer. Acad. Mem. ser. 2, v. 4, pp. 1–116. Boston, 1849.)

Species referred to: 17.

Gray, Pl. Lindh. *See* **Engelm. and Gray, Pl. Lindh.**

Gray, Pl. Thurb. Gray, Asa. Plantæ novæ Thurberianæ; the characters of some new genera and species of plants in a collection made by Geo. Thurber, chiefly in New Mexico and Sonora. Cambridge, 1854. 4°. (Amer. Acad. Mem. ser. 2, v. 5, pp. 297–328.)

Species referred to: *Dalea fremontii*, *Eremiastrum bellioides*, *Petalonyx thurberi*, *Robinia neomexicana*.

Gray, Pl. Wright. Gray, Asa. Plantæ Wrightianæ Texano-Neo-Mexicano. 2 pts. Washington, 1852, 53. 4°. (Smithson. Instit. Contr. to knowledge, v. 3, 5.)

Species referred to: 18.

Gray, Syn. Fl. Gray, Asa. Synoptical flora of North America. v. 1, pt. 2; v. 2, pt. 1. New York, 1884, 1878. 4°.

———— Same. Ed. 2. 2 v. in 1. New York, 1886; Washington, 1888. 8°.

V. 2, pt. 1, was first published at New York in 1878; v. 1, pt. 2, issued in 1884, was published, as was the subsequent edition of the whole work, by the Smithsonian Institution. In 1886 a second edition of both parts was published containing corrections made upon the electrotype plates, together with a supplement of pages 445 to 455 added to v. 1, pt. 2, and another of pages 393 to 462 added to v. 2, pt. 1. This second edition was reissued in 1888 as No. 591, Smithsonian Miscellaneous Collections.

Species referred to, 32.

Greene, Fl. Fran. Greene, E. L. Flora Franciscana. pt. 1, 2. San Francisco, 1891. 8°.

Species referred to, 11.

Greene, Pittonia. Greene, E. L. Pittonia; a series of botanical papers. v. 1, 2. Berkeley, 1887–92. 8°.

Species referred to, 61.

H. B. K. Nov. Gen. & Sp. Humboldt, F. A. von, Bonpland, A., and Kunth, C. S. Nova genera et species plantarum. v. 1–4, 6. Lutetiæ Parisiorum, 1815, 17, 18, 20, 23. f°.

Species referred to, 11.

***Hill. Veg. Syst.** Hill, John. The vegetable system; or, The internal structure and the life of plants. v. 10. London, 1765. f°.

Species referred to: *Oxyria digyna*.

Hook. Fl. Bor. Amer. Hooker, W. J. Flora Boreali-Americana; or, Botany of the northern parts of British America, principally from plants collected on the expedition under Sir John Franklin. London, 1833–40. 2 v. 4°.

The following dates of publication of the parts as issued are given by B. D. Jackson in Bulletin de L'Herbier Boissier, v. 1, p. 298 (1893): v. 1, pt. 1, pp. 1–48, 1829; pts. 2 and 3, pp. 49–144, 1830; pts. 4–6, concluding v. 1, 1834; v. 2, pt. 7, pp. 1–48, 1834; pt. 8, pp. 49–96, 1838; pt. 9, pp. 97–144, 1838; pt. 10, pp. 145–192, [1838]; pt. 11, pp. 193–241, 1839; pt. 12, pp. 241 to end, 1840.

Species referred to, 42.

Hook. Ic. Pl. HOOKER, W. J. Icones plantarum: or, Figures, with descriptive characters and remarks of new and rare plants, selected from the Kew herbarium. v. 1, 3, 7, 9. London, 1837, 40, 44, 8°.

Species referred to: *Pholisma arenarium*, *Populus trichocarpa*, *Trifolium obtusiflorum*, *Tropidocarpum gracile*.

Hook. Journ. Bot. & Kew Gard. Misc. HOOKER's journal of botany, and Kew garden miscellany; ed. by W. J. Hooker. v. 3. London, 1851. 8°.

Species referred to: *Coldenia nuttallii*, *Plagiobothrys tenellus*.

Hook. Kew Journ. Bot. (*See* **Hook. Journ. Bot. & Kew Gard. Misc.**)

Hook. Sp. Fil. HOOKER, W. J. Species Filicum. v. 2. London, 1858. 8°.

Species referred to: *Pellaea ornithopus*, *P. densa*, *P. bridgesii*.

Hook. & Arn. Bot. Beech. HOOKER, W. J., and ARNOTT, G. A. W. The Botany of Capt. Beechey's Voyage to the Pacific and Bering Strait, in the years 1825–28. London, 1841. 4°.

Dates of publication: pp. 1–48, 1830; pp. 49–114, 1832; pp. 145–192, 1833; pp. 193–240, 1836; pp. 241–288, not known; pp. 289–336, 1839 or 40; pp. 337–384, 1840 or 41; pp. 385 to end, 1841.—B. D. Jackson in litt.

Species referred to, 26.

Hook. & Grev. Ic. Fil. HOOKER, W. J. and GREVILLE, R. K. Icones Filicum v. 2. Londini, 1831. f°.

Species referred to: *Marsilia vestita*.

* **Huds. Fl. Angl.** HUDSON, WILLIAM. Flora Anglica. London, 1762. 8°.

Species referred to: *Berula erecta*, under *Sium*.

James, Cat. JAMES, E. B. Catalogue of plants collected during a journey to and from the Rocky Mountains during the summer of 1820, on the exploring expedition commanded by S. H. Long. (*In* Amer. Phil. Soc. Trans. ser. 2, v. 2, pp. 172–190. Philadelphia, 1825.)

Species referred to: *Atriplex canescens*.

James, Long Exped. JAMES, EDWIN, compiler. Account of an expedition from Pittsburgh to the Rocky Mountains in 1819–20, under the command of Maj. S. H. Long. v. 2. Philadelphia, 1823. 8°.

Species referred to: *Pinus flexilis*.

* **Jeffr. Rep. Oreg. Exped.** JEFFREY, JOHN. Botanical expedition to Oregon. Edinburgh, 1853. 4°.

Species referred to: *Pinus balfouriana*, *P. jeffreyi*, *P. murrayana*, *Tsuga pattoniana*, under *Abies*.

Journ. Acad. Phila. Academy of natural science of Philadelphia. Journal. v. 2, 3, 7. Philadelphia, 1821, 23, 34. 8°.

Species referred to, 11.

* **Journ. Hist. Nat.** Journal d'histoire naturelle; rédigé par Berthollet. v. 1. Paris, 1787. 4°.

Species referred to: *Phacelia magellanica*.

Journ. Hort. Soc. Lond. Horticultural society of London. Journal. v. 3, 4. London, 1848–50. 8°.

Species referred to: *Nemophila maculata*, *Pinus attenuata*, as *P. tuberculata*.

Journ. Linn. Soc. LINNEAN SOCIETY. Journal. v. 14, 19. London, 1875, 80. 8°.

Species referred to: *Calochortus nudus*, as *C. elegans subclavatus*, *Hilaria mutica*, *Symphoricarpos longiflorus*.

Journ. N. Y. Micros. Soc. New York microscopical society. Journal v. 5. New York, 1889. 8°.

Species referred to: *Eleocharis parishii*.

Journ. Phys. Journal de physique, de chimie, d'histoire naturelle et des arts, par J. C. Lamétherie et H. M. Ducrotay de Bainville. v. 89. Paris, 1819. 4°.

Species referred to: *Elymus elymoides*, under *Sitanion*.

* **Journ. Sci.** Journal of science and the arts; ed. at the Royal institution of Great Britain. v. 1. London, 1816. 8°.

Species referred to: *Chlorogalum pomeridianum*, under *Anthericum*.

Kaulf. Enum. Fil. KAULFUSS, G. F. Enumeratio Filicum. Lipsiæ, 1824. 8°.

Species referred to: *Aspidium rigidum argutum*, as *A. argutum*, *Gymnogramme triangularis*, *Pellæa andromedæfolia*, under *Pteris*.

Kong. Akad. Stock. Förh. Kongl. svenska vetenskaps-akademien. Oefversigt af * * * forhandlingar. v. 12. Stockholm, 1855. 8°.

Species referred to: *Imperata hookeri*.

Kongl. Sven. Akad. Handl. Kongelige svenska vetenskaps akademien. Handlingar. ser. 4, v. 6. Stockholm, 1867. 4°.

Species referred to: *Salix longifolia argyrophylla*.

Kunth, Enum. Pl. KUNTH, K. S. Enumeratio plantarum. v. 2, 4. Stuttgardiæ et Tubingæ, 1837, 43. 8°.

Species referred to: *Chlorogalum pomeridianum*, *Eleocharis atropurpurea*.

Kuntze, Rev. Gen. Pl. KUNTZE, O. Revisio generum plantarum. pt. 1, 2. Leipzig, 1891. 8°.

Species referred to, 16.

L. Amœn. Acad. LINNÆUS, CARL. Amœnitates academicæ. v. 3. Holmiæ, 1756. 8°.

Species referred to: *Malva parviflora*.

L. Mant. Pl. LINNÆUS, CARL. Mantissa plantarum, generum editionis 6, et speciorum editionis 2. Holmiæ, 1767. 8°.

Species referred to: *Woodwardia radicans*, under *Blechnum*.

——— ——— Mantissa plantarum altera, generum editionis 6, et speciorum editionis 2. Holmiæ, 1771. 8°.

Species referred to: *Cyperus lævigatus*.

L. Sp. Pl. LINNÆUS, CARL. Species plantarum. Holmiæ, 1753. 2 v. 8°.
———. ed. 2. Holmiæ, 1762–63. 2 v. 8°.
———. ed. 4; curante Willdenow. v. 5. Berolini, 1810. 8°.

Species referred to, 118.

Lag. Gen. Nov. LAGASCA, MARIANO. Genera et species plantarum, quæ aut novæ sunt aut nondum recte cognoscuntur. Matriti, 1816. 4°.

Species referred to: *Palafoxia linearis*.

Lam. Encycl. LAMARCK, J. B. A. P. DE M. DE, and POIRET, J. M. Encyclopédie méthodique botanique. v. 6. Paris, 1804. 4°.

Species referred to: *Epilobium anagallidifolium*.

Lam. Fl. Fr. LAMARCK, J. B. A. P. DE M. DE. La flore Françaises. v. 3. Paris, 1778. 8°.

Species referred to: *Phragmites vulgaris*, under *Arundo*.

* **Lamb. Gen. Pin.** LAMBERT, A. B. A description of the genus Pinus. Ed. 2. v. 3, ed. 1. London, 1837. f°. max.

Species referred to: *Pinus monticola*, *P. sabiniana*.

Ledeb. Fl. Ross. LEDEBOUR, C. F. Flora Rossica; sive, Enumeratio plantarum in totius imperii Rossici provinciis Europæis, Asiaticis et Americanis hucusque observatarum. v. 1, 4. Stuttgartiæ, 1842, 53. 8°.

This work was published in fourteen fascicles during the years 1841 to 1853.
Species referred to: *Draba stenoloba*, *Juncus subtriflorus*, as *J. drummondii*.

Lehm. Add. Ind. Hort. Hamb. LEHMANN, J. G. C. Index seminum Horti botanici Hamburgiensis. [Hamburg] 1849.

Species referred to: *Potentilla rivalis millegrana.*

Lehm. Pug. LEHMANN, J. G. C. Novarum et minus cognitarum stirpium pugilli. pt. 2. Hamburgi, 1830. 4°.

The title of pt. 2 is "Stirpium ab J. G. C. Lehmann primum descriptarum pugillus secundus." Species referred to: *Cryptanthe flaccida*, under *Myosotis*, *Lappula diffusa*, under *Echinospermum*.

Lemmon, Third Cal. Rep. [LEMMON, J. G.] Third biennial report of the California state board of forestry for the years 1889–90. Sacramento, 1890. 8°.

Species referred to: *Pseudotsuga macrocarpa.*

Lightf. Fl. Scot. LIGHTFOOT, JOHN. Flora Scotica; or, A systematic arrangement of the native plants of Scotland and the Hebrides. London, 1777 v. 2. 8°.

Species referred to: *Carex incurva*, *Scirpus pauciflorus.*

Lindl. Gen. & Sp. Orchid. LINDLEY, JOHN. Genera and species of orchidaceous plants. London, 1830–40. 8°.

Published by signatures and the signatures dated: pp. 1–94, 1830; pp. 95–133, 1831; pp. 135–158, 1832; pp. 159–255, 1833; pp. 257–335, 1835; pp. 335–366, 1838; pp. 367–379, 1839; pp. 381–553, 1840.

Species referred to: *Habenaria elegans*, *H. leucostachys*, under *Platanthera.*

Link, Hort. Berol. LINK, H. F. Hortus regius botanicus Berolinensis descriptus. v. 1. Berolini, 1827. 8°.

Species referred to: *Fimbristylis vahlii.*

Link & Otto, Ic. Pl. Rar. LINK, H. F., and OTTO, F. Icones plantarum rariorum Horti regii botanici Berolinensis cum descriptionibus et colendi ratione. pt. 1. Berolini, 1828. 4°.

Species referred to: *Argemone platyceras.*

Linnæa. Linnæa; ein journal für die botanik in ihrem ganzen umfange; [from 1843] oder, Beiträge zur pflanzenkunde, hrsg. von D. F. L. von Schlectendal. v. 2, 3, 6, 12, 33, 41. Berlin & Halle, 1827, 28, 31, 38, 64, 77. 8°.

Species referred to, 15.

Lond. Journ. Bot. HOOKER, W. J. London journal of botany. v. 4–6. London, 1845–47. 8°.

Species referred to: *Biscutella californica*, under *Dithyræa*, *Holodiscus discolor*, as *Spiræa dumosa*, *Prosopis pubescens*, *Ptilocalais nutans*, under *Scorzonella.*

Loudon, Arbor. & Frut. LOUDON, J. C. Arboretum et fruticetum Britannicum. v. 4. London, 1838. 8°.

Species referred to: *Pinus ponderosa.*

McMillan, Metasp. Minn. Val. MCMILLAN, CONWAY. The metaspermæ of the Minnesota valley; a list of the higher seed-producing plants indigenous to the drainage-basin of the Minnesota river. Minneapolis, 1892. Q. (Geol. & Nat. Hist. Surv. of Minn. Rep. of surv.—Bot. ser.)

Species referred to: *Gyrostachys romanzoffiana.*

Mart. Fl. Bras. MARTIUS, C. F. P. VON. Flora Brasiliensis. v. 1, pt. 2; 2, pt. 2, 5, pt. 2. Vindobonæ & Lipsiæ, 1840, 71, 68. f°.

Species referred to: *Phalaris intermedia angusta*, as *P. angusta*, *Phoradendron bolleanum*, *Selaginella rupestris.*

Maxim. Adn. Spir. MAXIMOWICZ, J. C. Adnotationes de Spiræaceis. (*In* Act. Hort. Petrop. v. 6, pp. 105–261. 1879.)

Probably reprinted and repaged.

Species referred to: *Holodiscus discolor.*

Mem. Acad. St. Pet. Académie impériale des sciences de St. Pétersbourg. Mémoires. [ser. 5] v. 10; ser. 6, sci. math. phys. & nat. v. 1, 4, pt. 2 (sci. nat. v. 2). St. Pétersbourg, 1826, 31, 38.

Species referred to: *Glyceria nervata*, Rhamnus californica, Stipa viridula.

Mem. Acad. Turin. Académie royale des sciences. Mémoires. v. 5. Turin, 1790. 4°

Species referred to: *Woodwardia radicans.*

***Mem. Soc. Mosc.** Société des naturalistes de l'université impériale de Moscou. Mémoires. v. 5. 1821. 4°.

Species referred to: *Draba glacialis.*

Mem. Torr. Club. Torrey Botanical Club. Memoirs. v. 1, 3. New York, 1889–90, 93. 8°.

Species referred to: *Carex festiva stricta, C. jonesii, C. nebraskensis praevia, C. tolmiei subsessilis, Potamogeton foliosus niagarensis.*

Mett. Fil. Hort. Lips. METTENIUS, GEORG. Filices Horti botanici Lipsiensis. Leipzig, 1856. f°.

Species referred to: *Phegopteris alpestris.*

Mey. Syn. Junc. MEYER, E. H. F. Synopsis Juncorum. Gottingæ, 1822. 8°.

Species referred to: *Juncus xiphioides.*

Mo. Bot. Gard. Missouri Botanical Garden. Third annual report. St. Louis, 1892. 8°.

Species referred to: *Yucca arborescens, Y. radiosa.*

Moq. Enum. Chenopod. MOQUIN-TANDON, ALFRED. Chenopodearum monographica enumeratio. Parisiis, 1840. 8°.

Species referred to: *Eurotia lanata.*

***Moric. Pl. Nouv. Amer.** MORICAND, M. E. Plantes nouvelles d'Amérique. Genève, 1833–46. 4°.

Species referred to: *Larrea tridentata*, as *L. mexicana.*

Mx. Fl. MICHAUX, F. A. Flora Boreali-Americana. 2 v. Paris, 1803. 8°.

Species referred to, 16.

Neue Schrift. Gesell. Naturf. Freunde Berlin. Gesellschaft naturforschender freunde zu Berlin. Neue schriften. v. 4. Berlin, 1803. 4°.

Species referred to: *Salix longifolia.*

N. Y. Journ. Pharm. New York journal of pharmacy; ed. by B. W. McCready. v. 3. New York, 1854. 8°.

Species referred to: *Tumion californicum*, under *Torreya.*

Newberry, Pac. R. Rep. *See* **U. S. Pac. R. Rep.**

Nutt. Gen. NUTTALL, THOMAS. Genera of North American plants and a catalogue of species to the year 1817. Philadelphia, 1818. 2 v. in 1. 12°.

Species referred to, 16.

Nutt. Pl. Gamb. NUTTALL, THOMAS. Descriptions of plants collected by William Gamble in the Rocky Mountains and upper California. (*In* Acad. Nat. Sci. Phila. Journ. ser. 2, v. 1, pp. 149–189. [1848.] Philadelphia, 1847–50.)

Species referred to, 11.

Nutt. Syl. NUTTALL, THOMAS. North American sylva; or, A description of the forest trees of the United States, Canada, and Nova Scotia, not described in the work of F. A. Michaux, and containing all the forest trees discovered in the Rocky Mountains, the Territory of Oregon, down to the shores of the Pacific and into the confines of California, as well as in the various parts of the United States. v. 1, 3. Philadelphia, 1842–53. 8°.

Species referred to, 9.

Pers. Syn. Pl. PERSOON, C. H. Synopsis plantarum. Parisiis. 2 v. 1805, 1807. 12°.

Species referred to: *Baccharis glutinosa, Euphorbia serpillifolia, Scirpus americanus, Sorghum halepense.*

Poepp. Fragm. Syn. POEPPIG, E. F. Fragmentum synopseos phanerogamarum ab auctore annis 1827–29 in Chile lectarum. Lipsiæ, 1833. 8°.

Species referred to: *Anemone sphenophylla.*

Poir. Encycl. *See* **Lam. Encycl.**

Port. & Coult. Fl. Col. PORTER, T. C., and COULTER, J. M. Synopsis of the flora of Colorado. Washington, 1874. 8°. (U. S. geological and geographical survey of the territories, F. V. Hayden in charge. Miscellaneous publications. no. 4. Washington, 1874).

Species referred to: *Erigeron coulteri.*

Presl, Rel. Haenk. PRESL, C. B. Reliquiæ Haenkeanæ, sive, Descriptiones et icones plantarum, quas in America meridionali et boreali, in insulis Philippinis et Marianis collegit Thad. Haenke. Pragæ, 1830–36. 2 v. f°.

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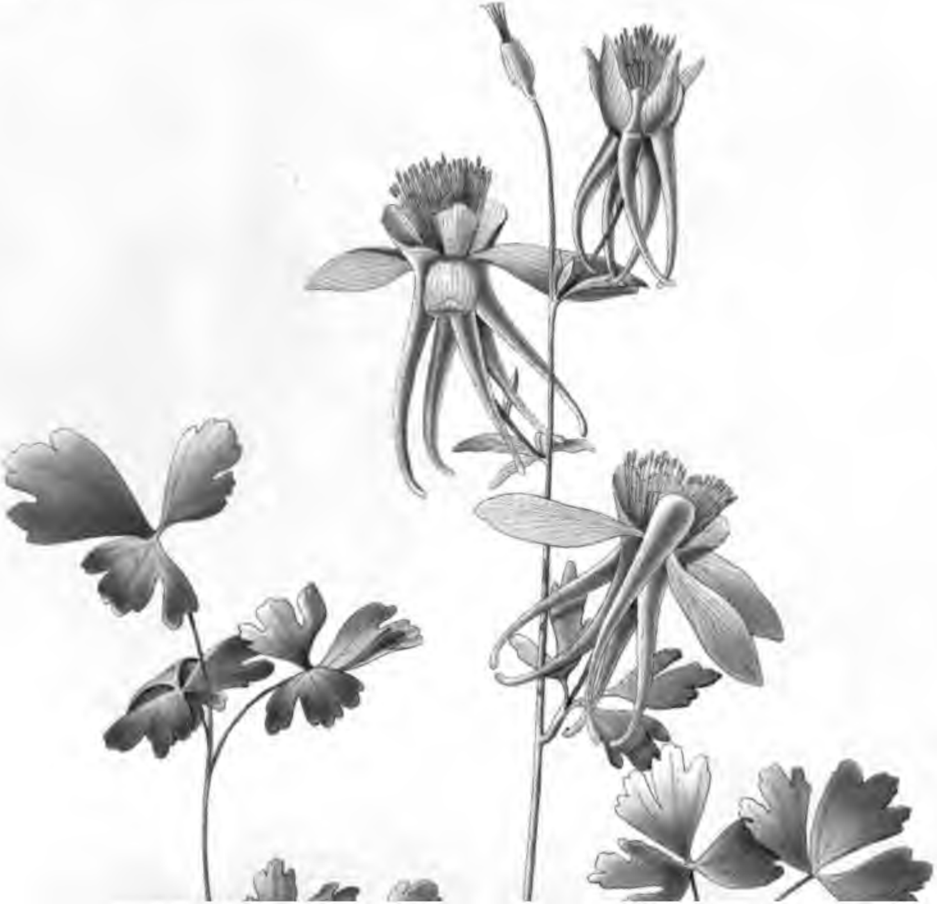
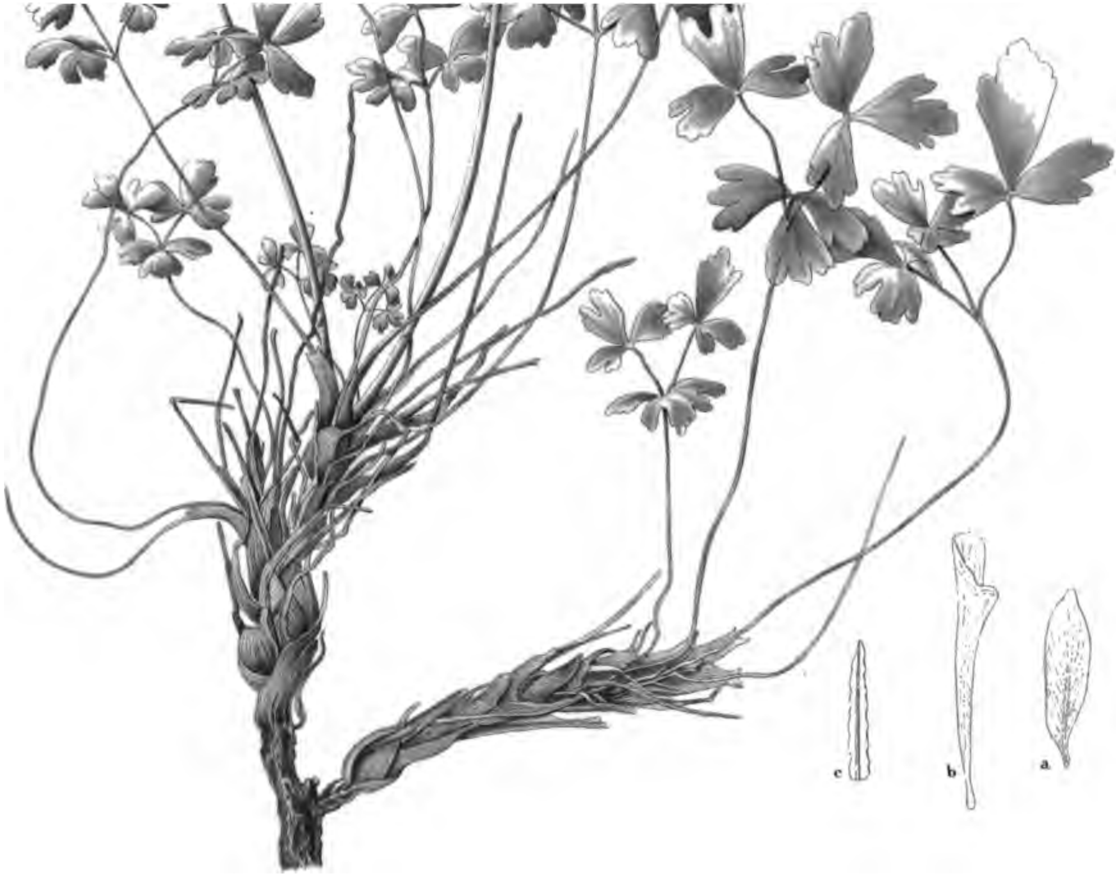
PLATE I.

Aquilegia pubescens Coville.

Fig. *a*, sepal; *b*, petal; *c*, staminodium, enlarged 2 diameters The structure terminating the stem is a flower whose sepals and petals have fallen, leaving the ovaries covered by the staminodia, the styles and stigmas exposed. The main figure is reduced to four-fifths its natural size. Description on page 56.





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AQUILEGIA PUBESCENS.

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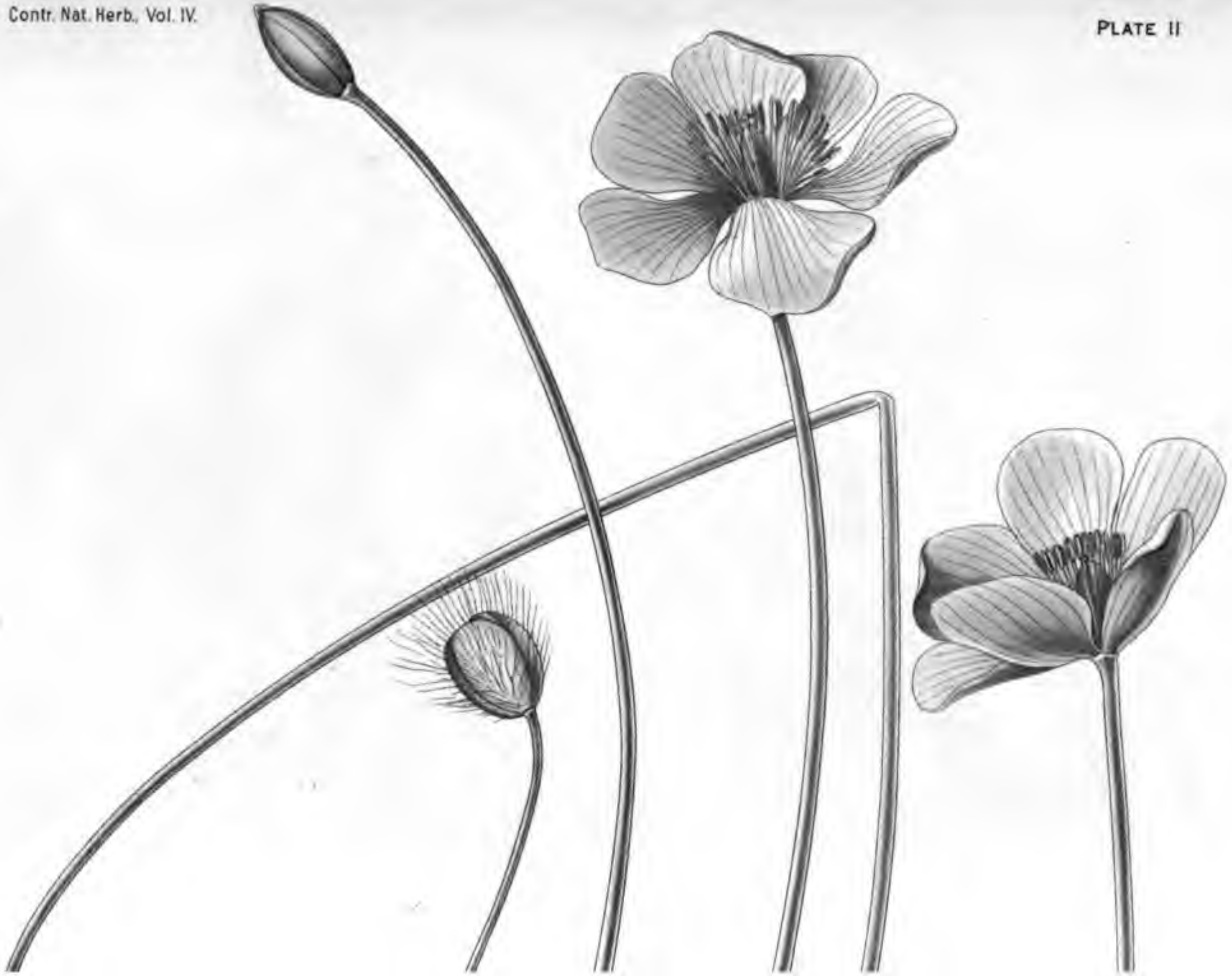
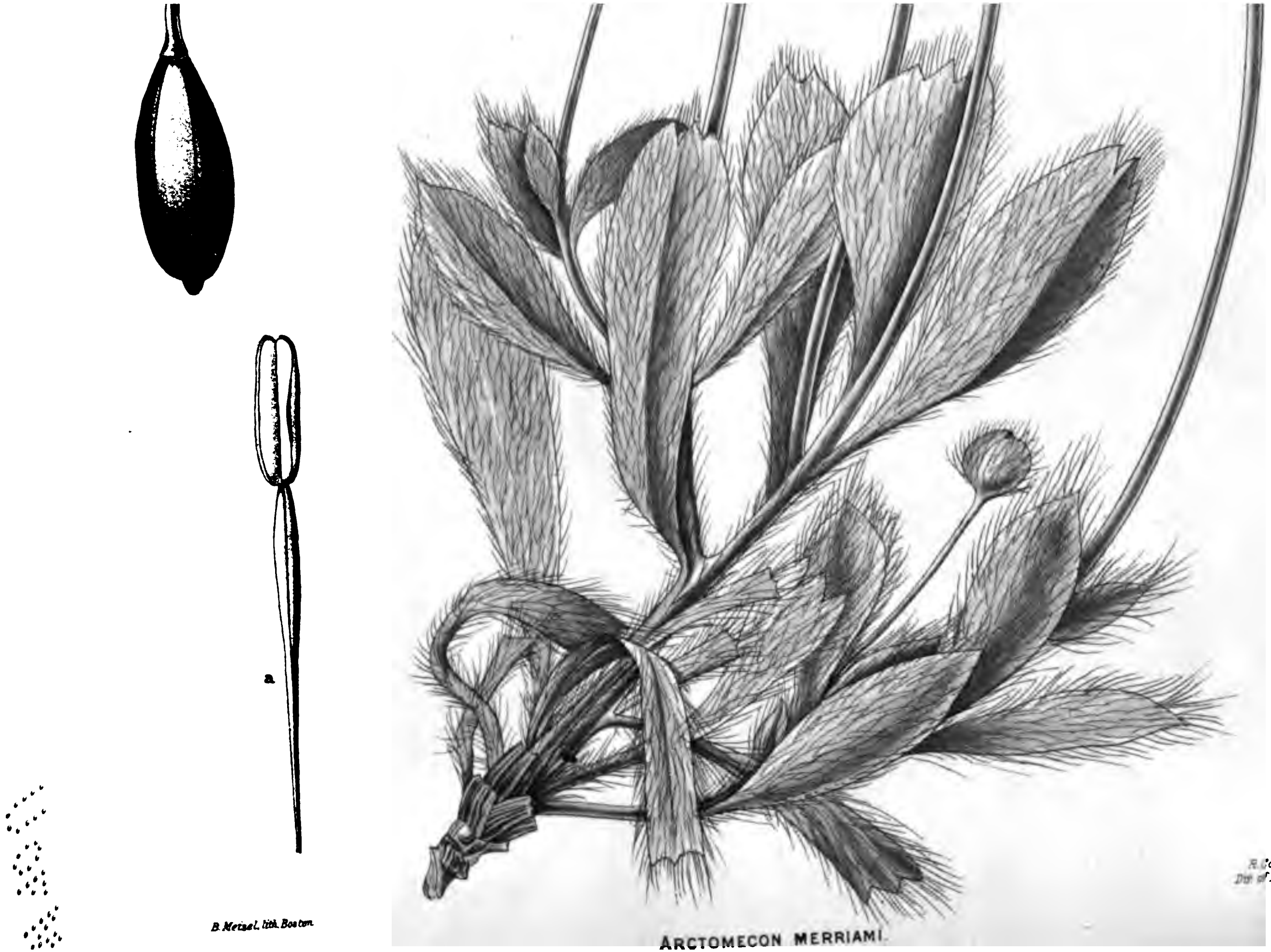
PLATE II.

Arctomecon merriami **Coville.**

Fig. *a*, stamen, enlarged 6 diameters. The plate represents two buds, two flowers, and two immature capsules, one of the last having attained its full size. Description on page 59.

PLATE II





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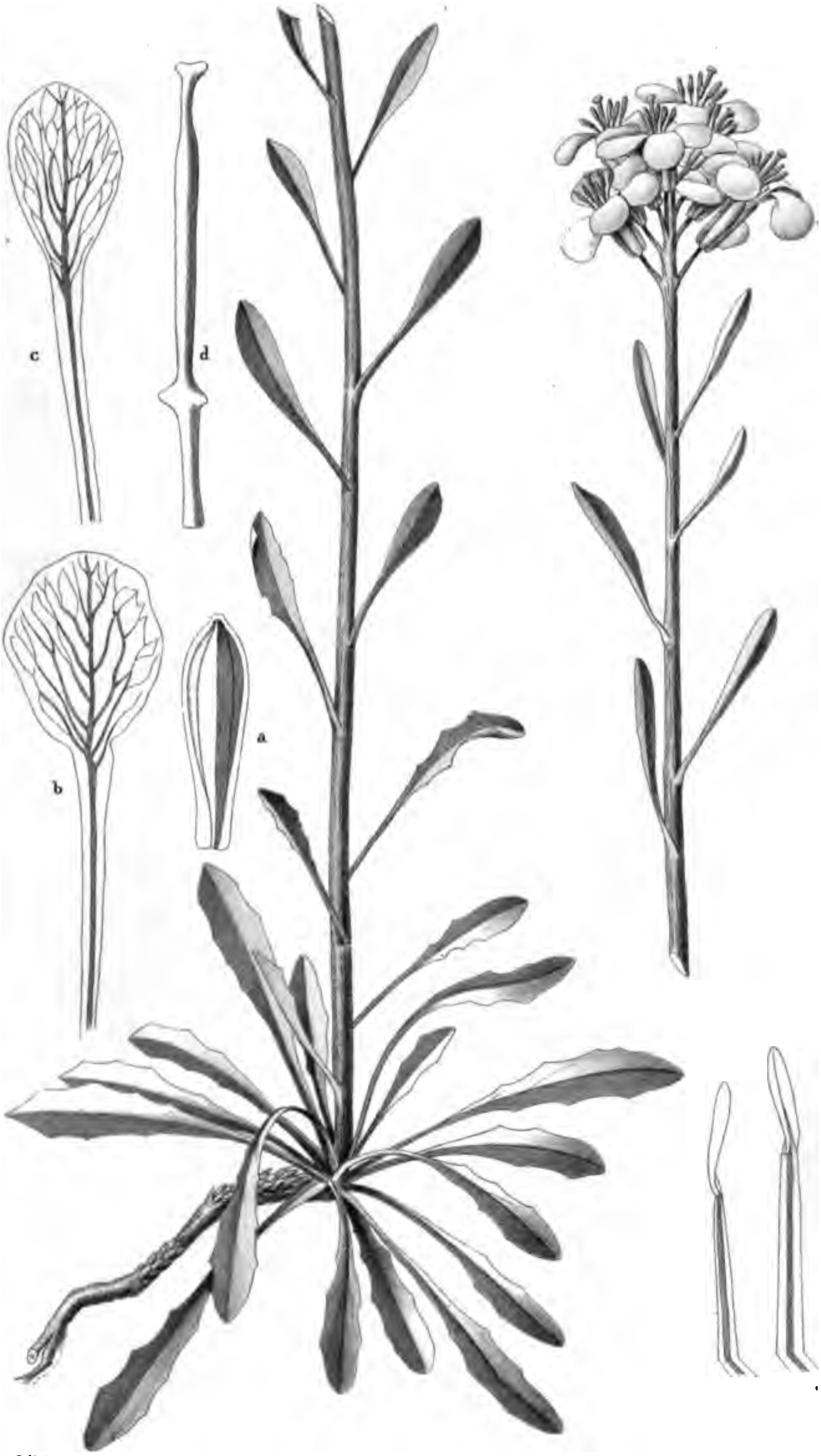
ARCTOMECON MERRIAMI.

PLATE III.

Erysimum asperum perenne Wats.

Fig. *a*, sepal; *b* and *c*, petals; *d*, ovary and pedicel; *e*, stamens. Figs. *a* to are enlarged 3 diameters from moist specimens. Description on page 64.



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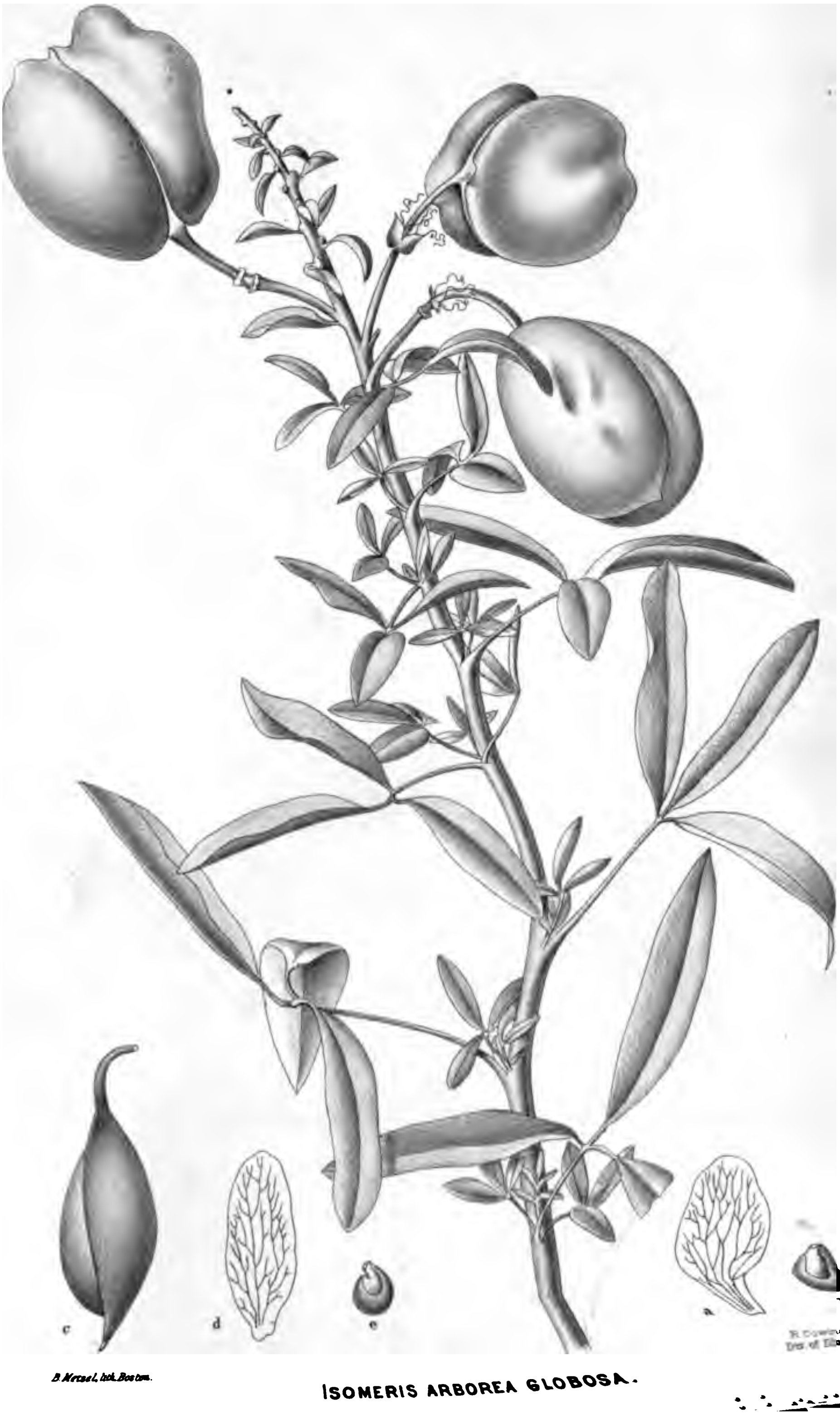
ERYSIMUM ASPERUM PERENNE.

PLATE IV.

Isomeris arborea globosa **Coville.**

Fig. *a*, petal; *b*, seed; *c*, *d*, and *e*, capsule, petal, and seed of *Isomeris arborea* Nutt. Figs. *a* and *d* are enlarged 2 diameters. Description on page 67.

PLATE IV.



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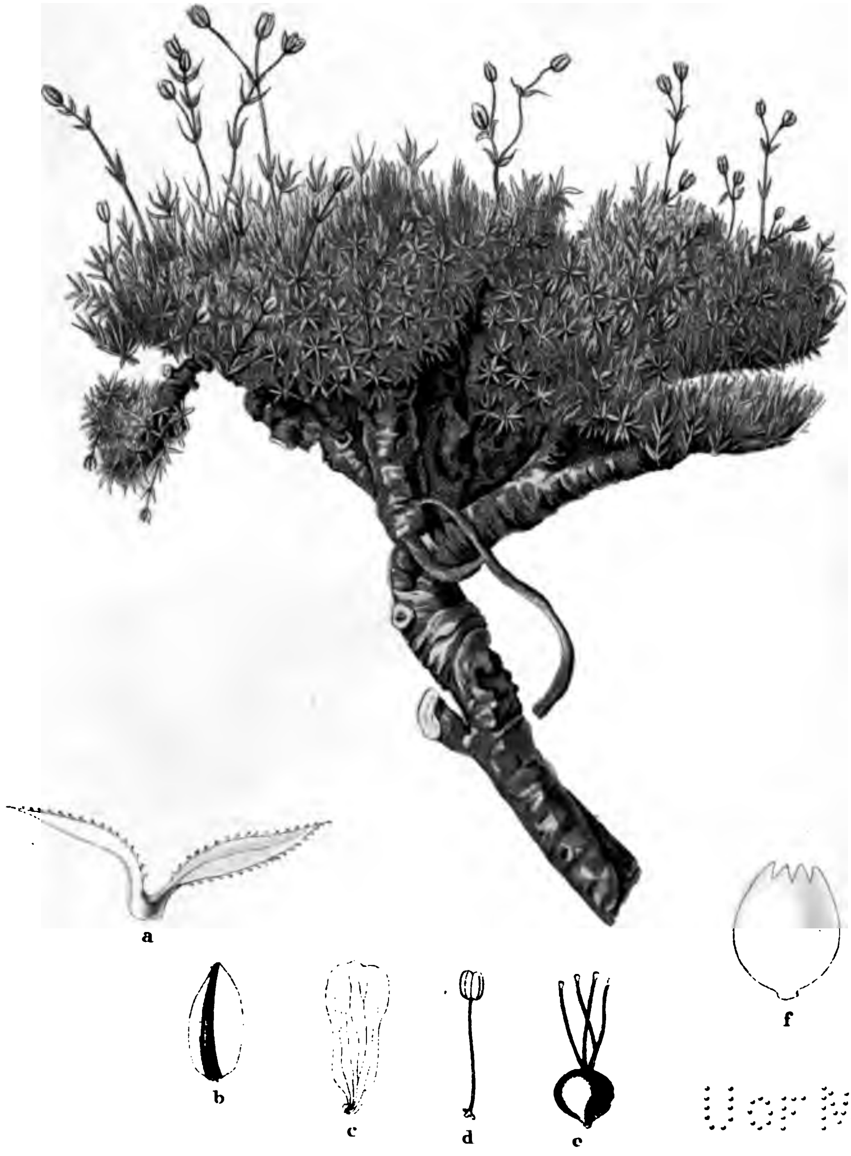
ISOMERIS ARBOREA GLOBOSA.

PLATE V.

Arenaria compacta Coville.

Fig. *a*, pair of leaves; *b*, sepal; *c*, petal; *d*, stamen; *e*, pistil; *f*, capsule. Figs. *a* to *f* are enlarged 5 diameters. Description on page 70.



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ARENARIA COMPACTA.

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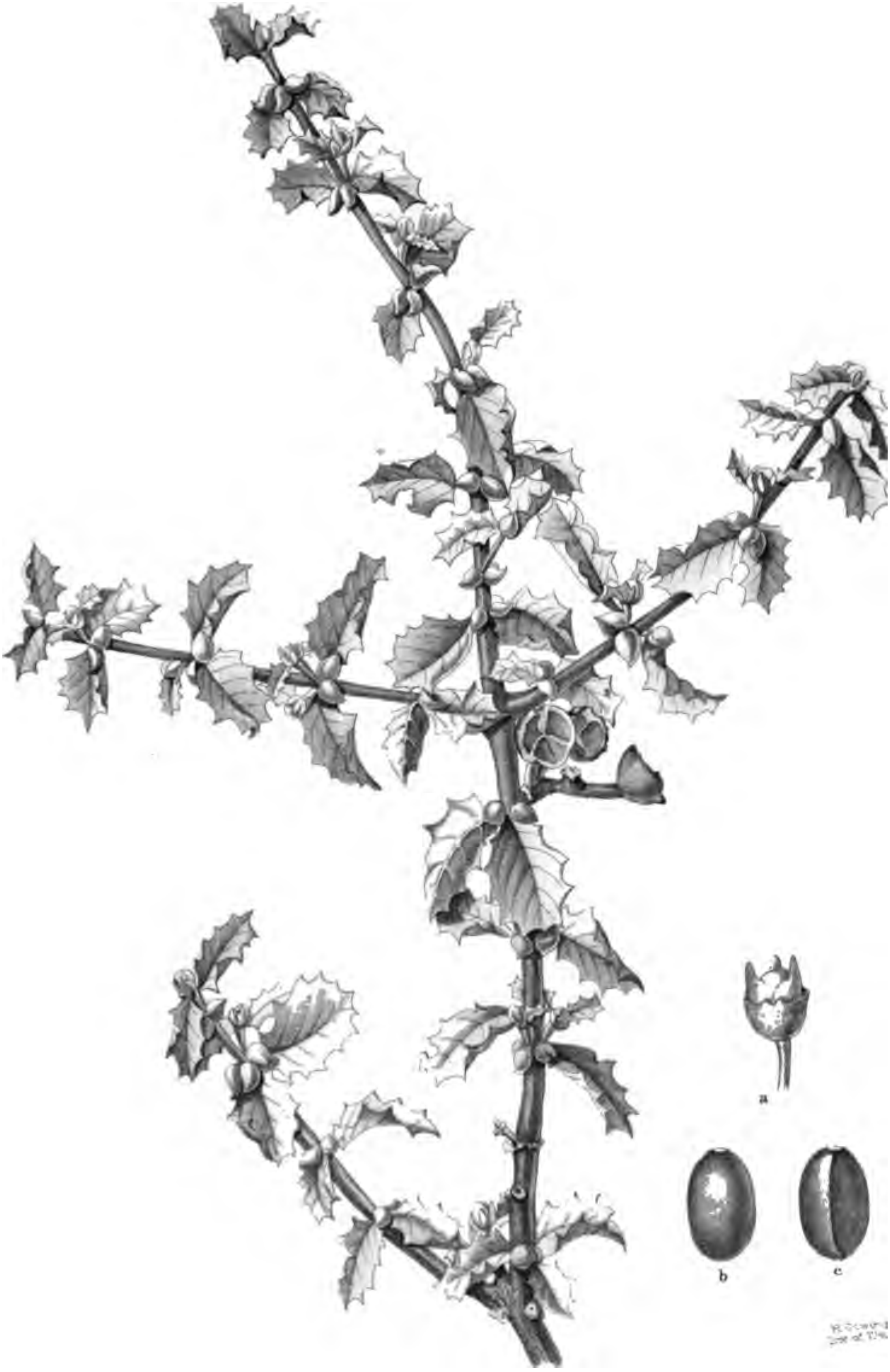
PLATE VI.

Ceanothus pinetorum Coville.

Fig. *a*, capsule; *b* and *c*, seed, viewed from either face and enlarged 4 diameters. The portions of the fruit seen on the main figure are mature capsules from which the upper portion and the seeds have fallen away. Description on page 80.



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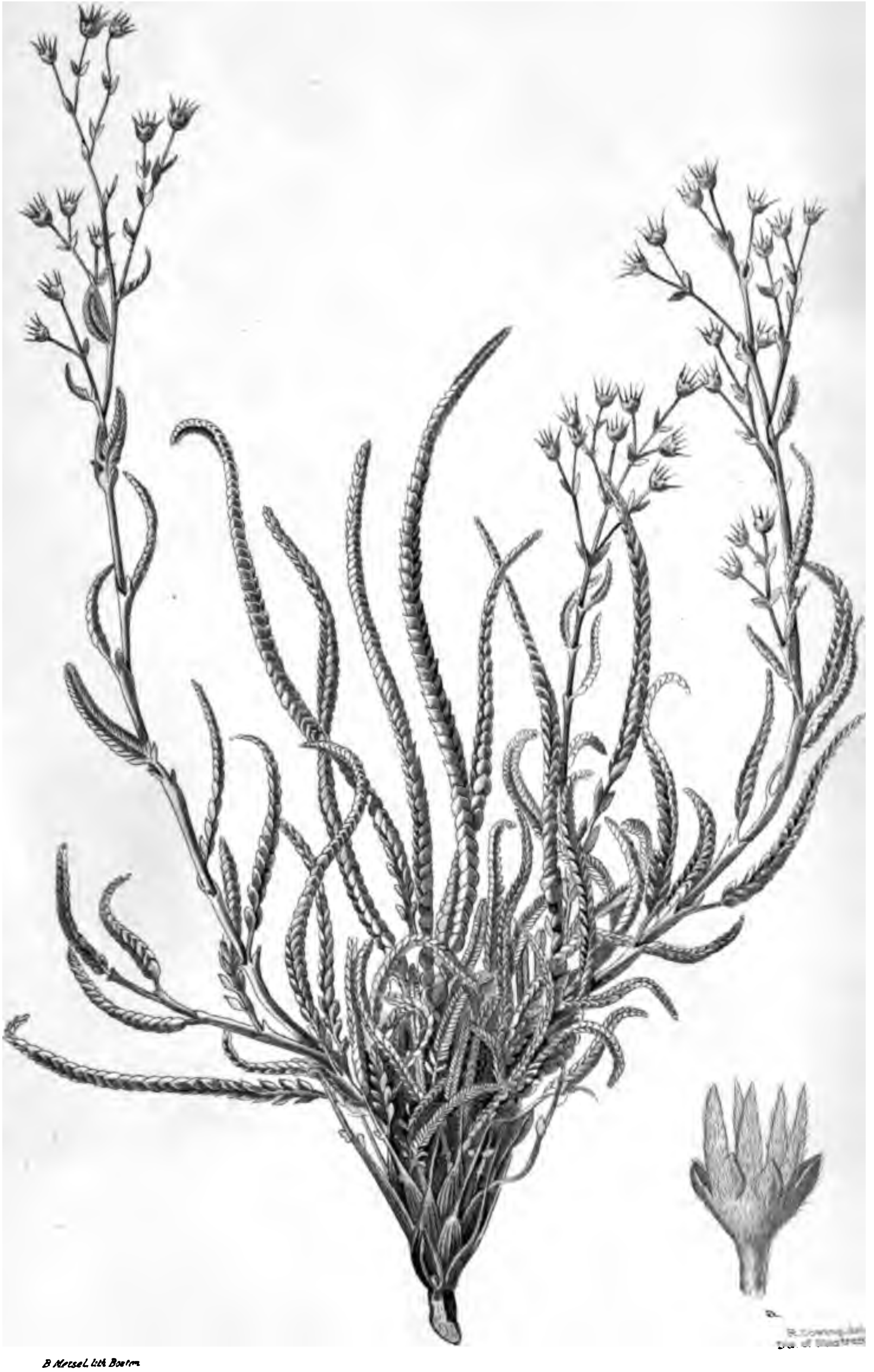
CEANOTHUS PINETORUM.

PLATE VII.

Potentilla eremica **Coville.**

Fig. *a*, calyx, enlarged 5 diameters. Only a portion of the plant, in its winter condition, is represented in the plate. Description on page 95.



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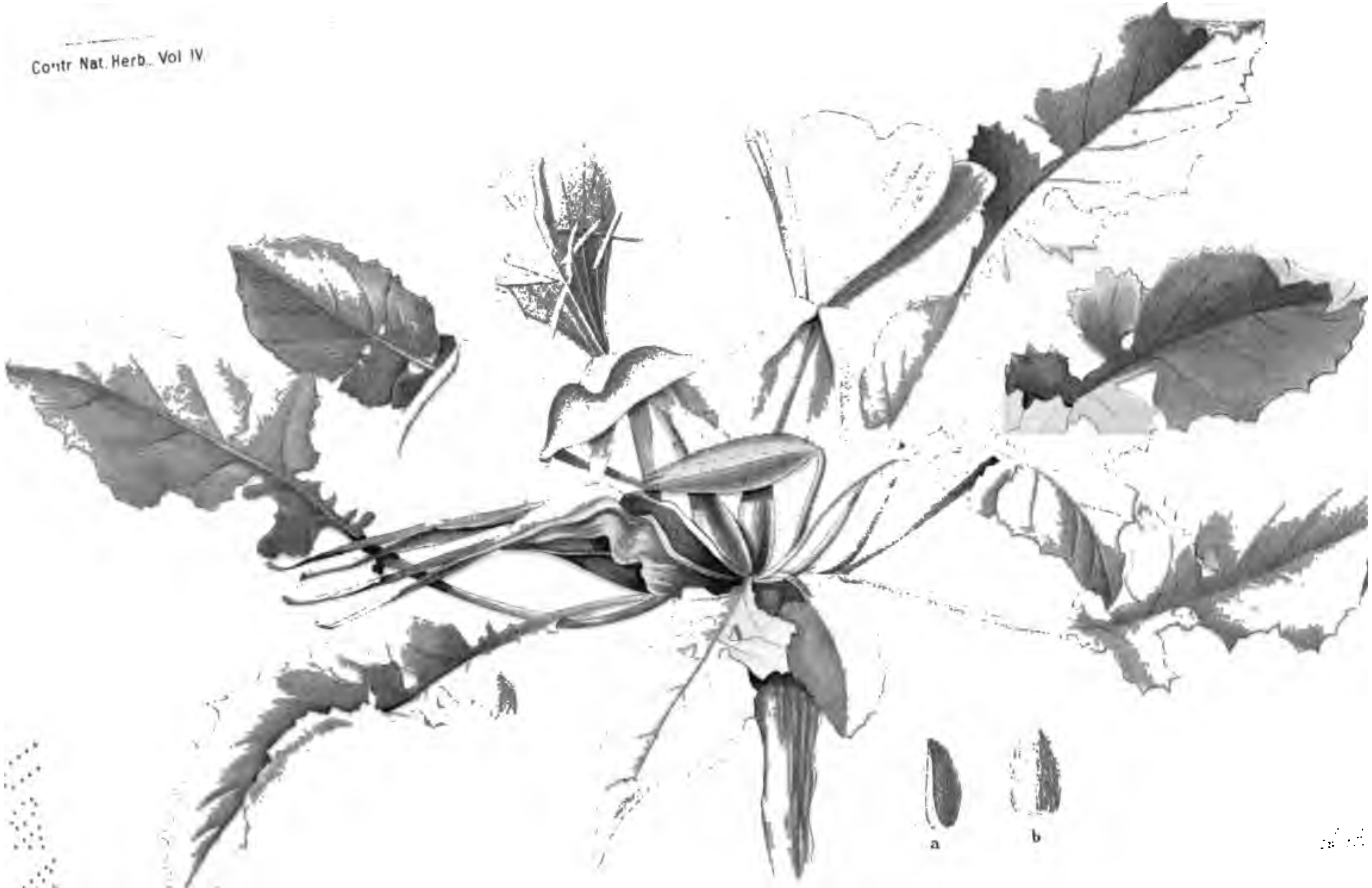
POTENTILLA EREMICA.

PLATE VIII.

Œnothera xylocarpa **Coville.**

Figs. *a* and *b*, seed, viewed from either face, enlarged 5 diameters. The seed is attached to the placenta by its narrow end, the broader end pointing toward the apex of the capsule. In fig. *a* the raphe and the point of insertion are shown. The nodding of the bud in the main figure is probably an individual peculiarity of this specimen. Description on page 105.



ŒNOTHERA XYLOCARPA.

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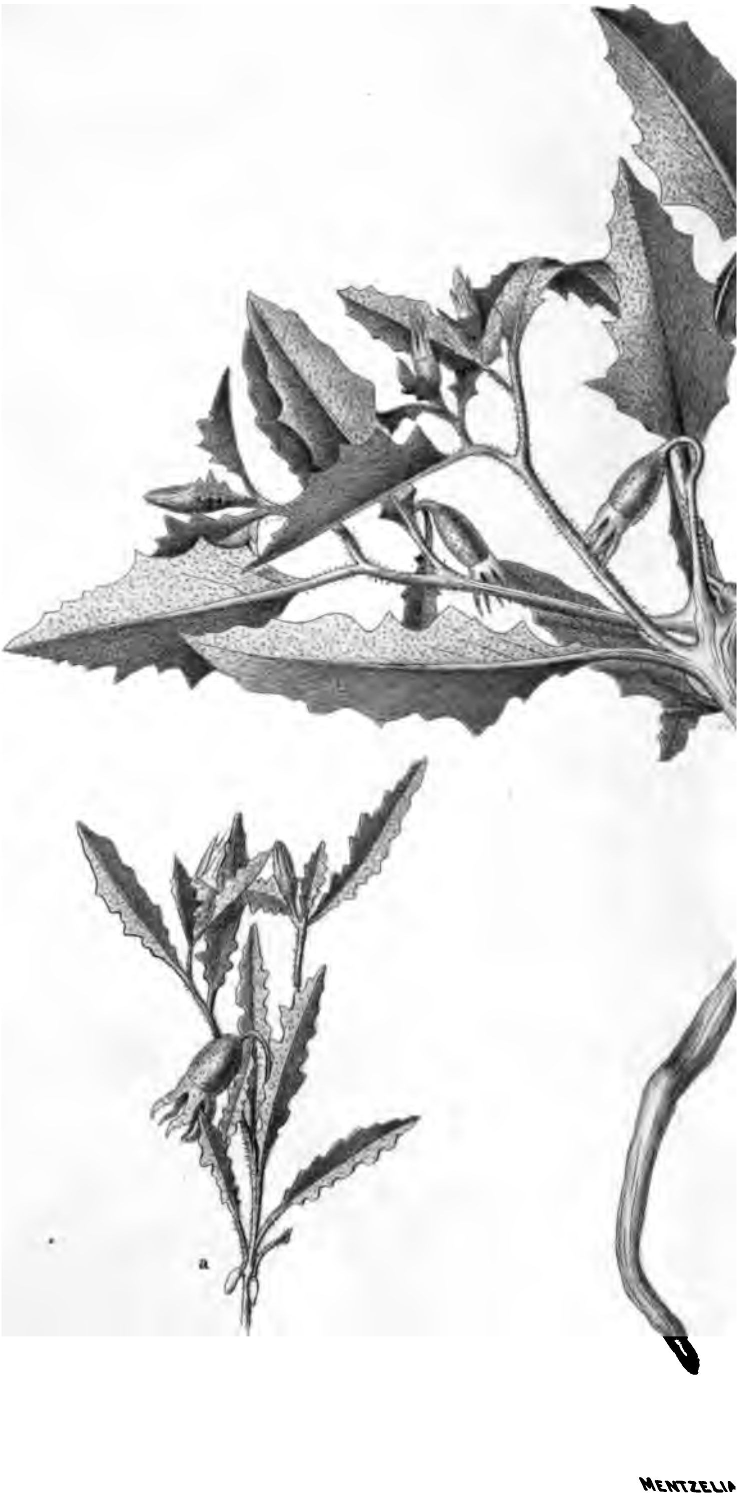
PLATE IX.

Mentzelia reflexa Coville.

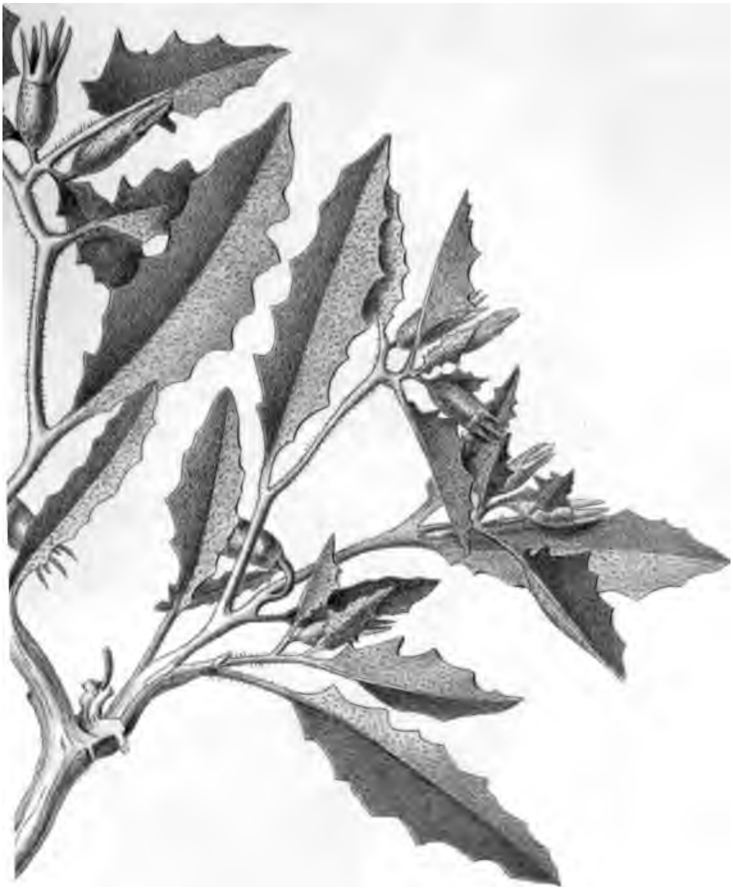
Fig. *a*, depauperate plant; *b*, seed, enlarged about 15 diameters. **Description on** page 108.



B. Meisel. lith. Boston

MENTZELIA

PLATE IX.



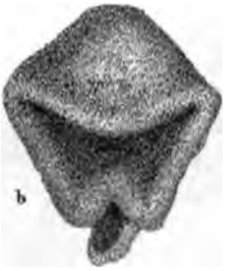


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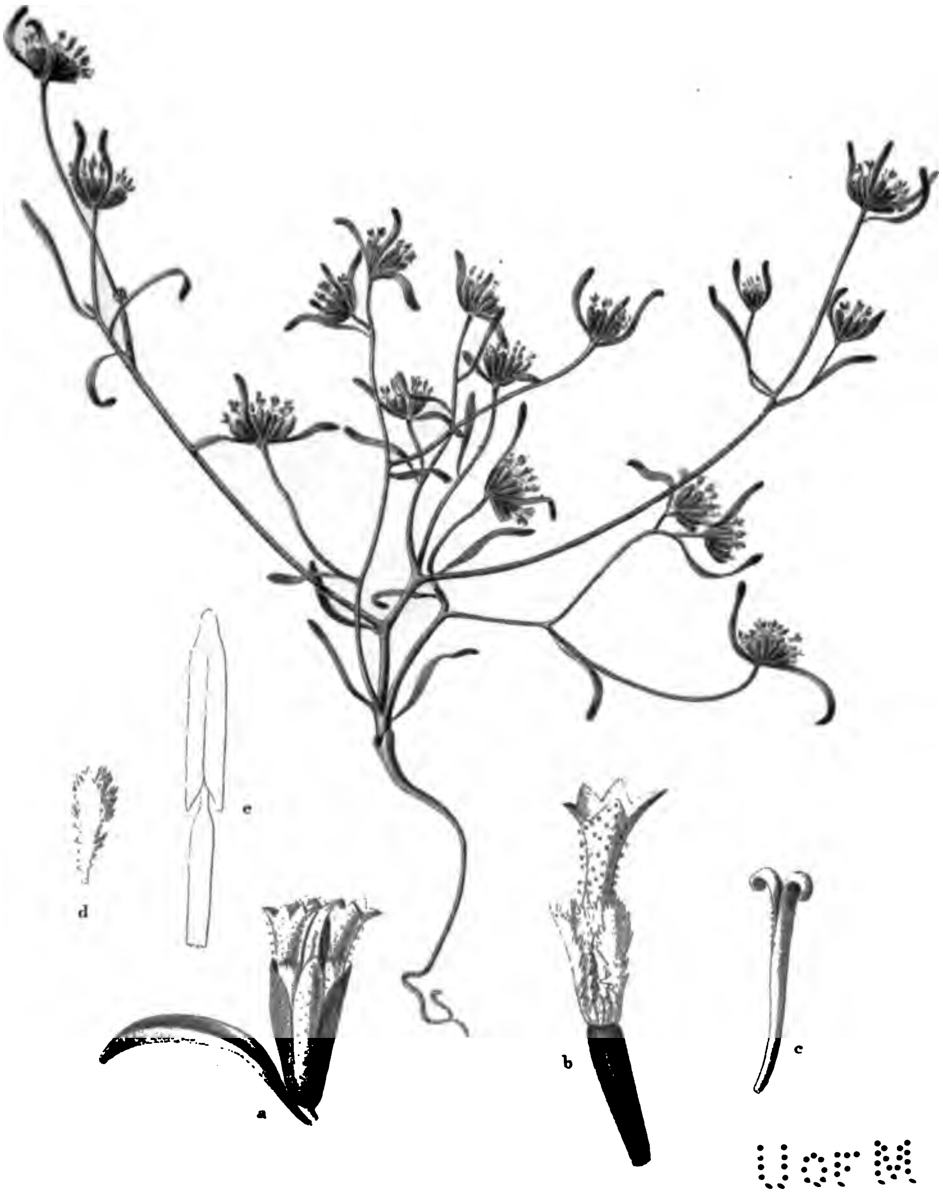
PLATE X.

Orochænactis thysanocarpha (Gray) Coville.

Fig. ***a,*** anthodium; ***b,*** flower; *c,* style and stigmas; ***d,*** **pappus scale;** ***e,*** **stamen.** Fig. *a* is enlarged 4 diameters; figs. *b, c,* and *d,* 8 diameters; and fig. *e,* about 16 diameters. Description on page 134.

PLATE X.



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OROCHÆNACTIS THYSANOCARPHA.

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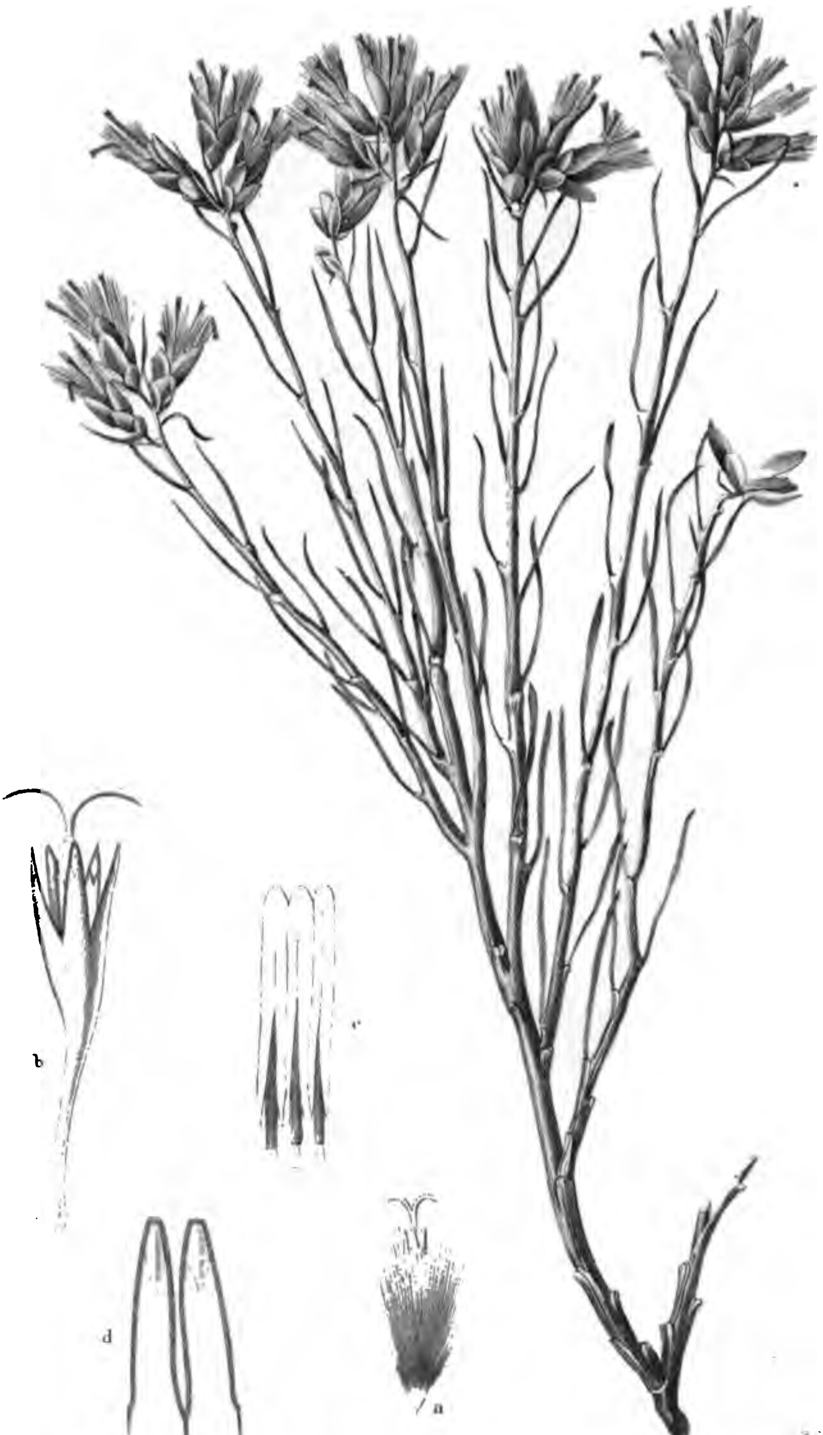
PLATE XI.

Lepidospartum striatum Coville.

Fig. *a*, flower, enlarged 2 diameters; *b*, corolla, stamens, and style, enlarged 8 diameters; *c*, three stamens, and *d*, two corolla lobes, both enlarged about 16 diameters. Description on page 140.



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LEPIDOSPARTUM STRIATUM.

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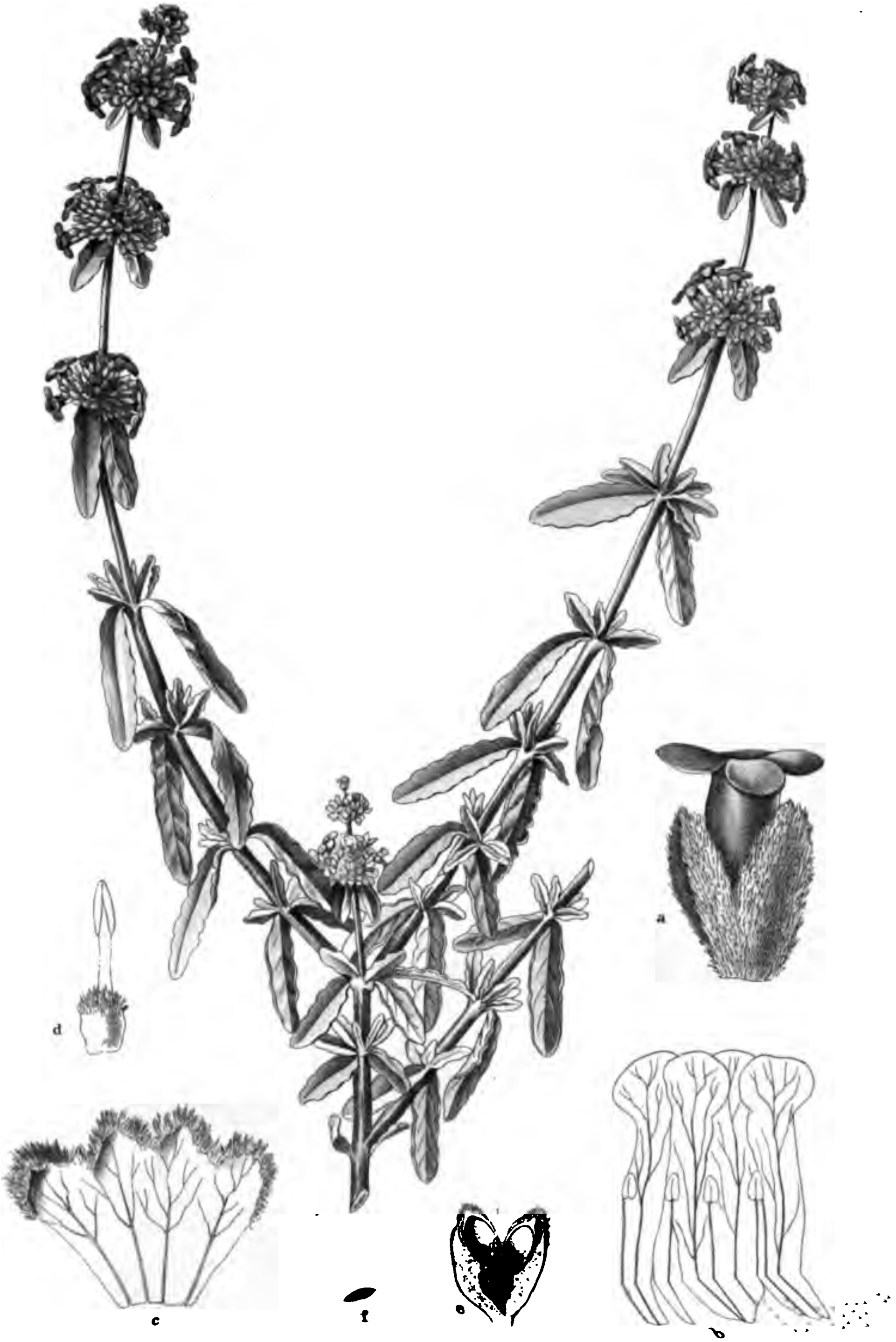
PLATE XII.

Buddleia utahensis Coville.

Fig. *a*, flower; *b*, corolla, split and viewed from the inside, showing the sessile anthers; *c*, calyx, split and viewed from the inside; *d*, pistil; *e*, one-half the two-celled septicidal capsule, viewed from the inside and showing the large, roughened placenta of the missing cell; *f*, seed. Figs. *a* to *e* are enlarged 7 diameters; fig. *f*, 10 diameters. Description on page 149.



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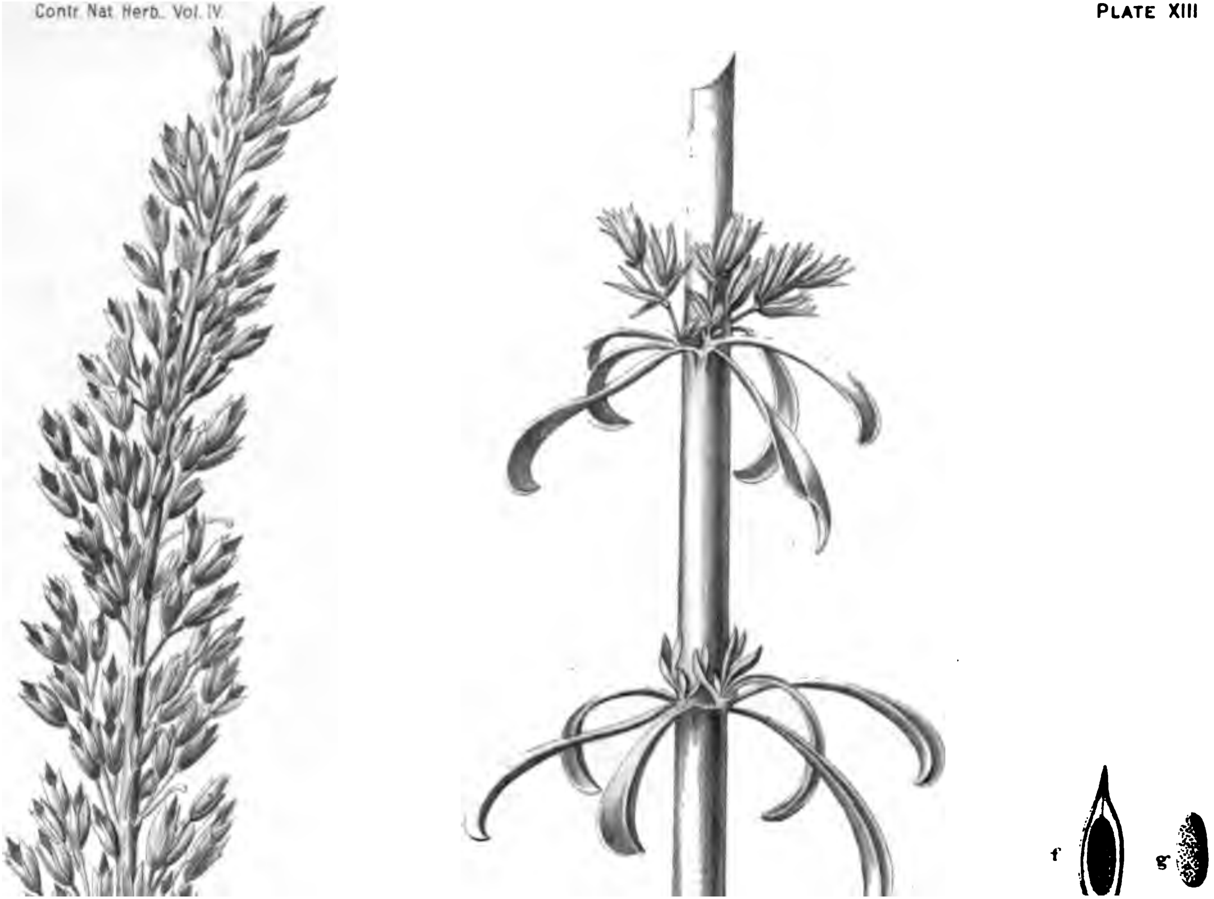
BUDDLEIA UTAHENSIS.

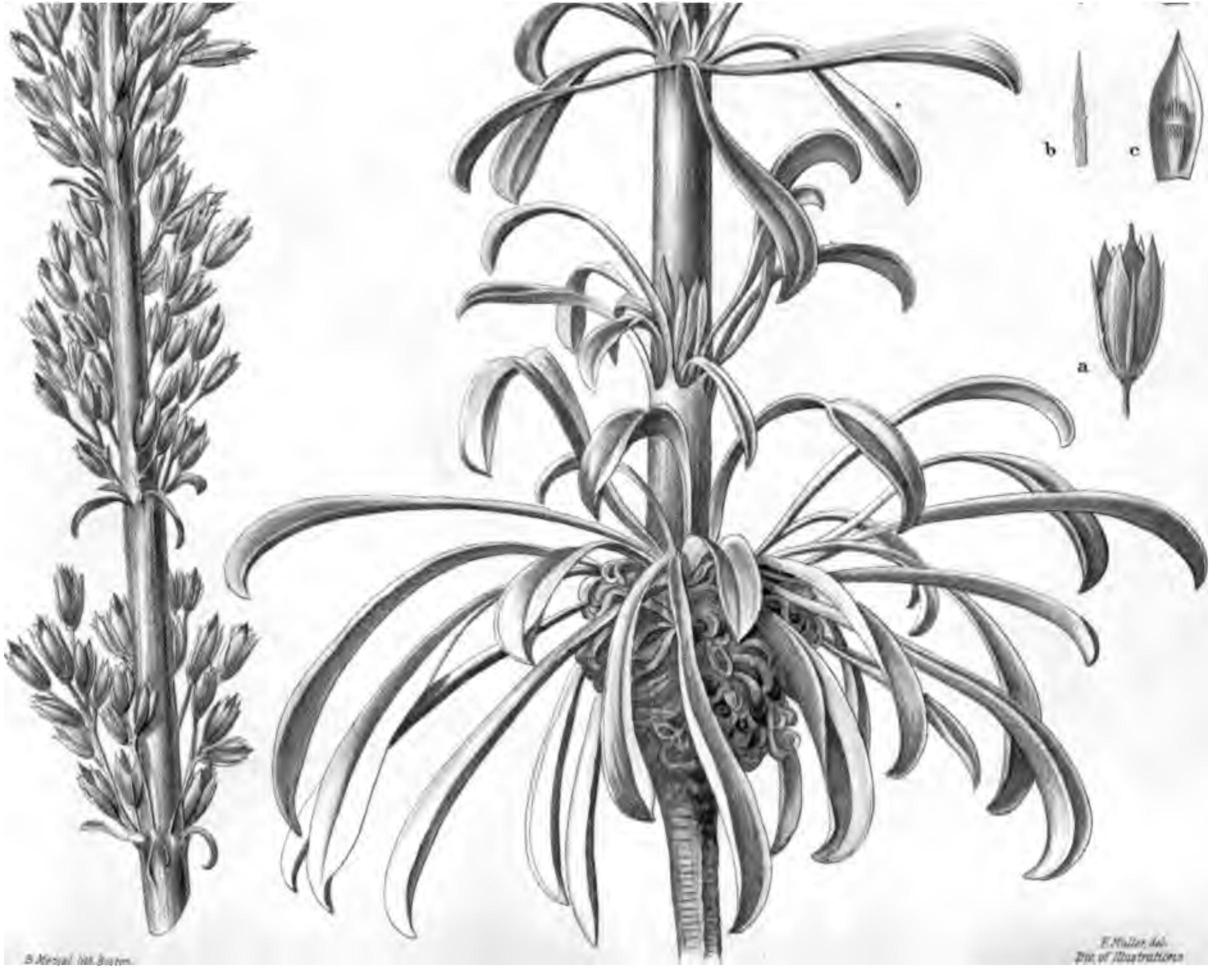
PLATE XIII.

Frasera tubulosa Coville.

Fig. *a*, flower; *b*, division of the calyx; *c*, division of the corolla, viewed from within, showing the tubular, transversely split, fimbriate nectary; *d*, stamen; *e*, pistil; *f*, capsule; *g*, seed. The lettered figures are enlarged 2 diameters, the main figure reduced to four-fifths its natural size. Description on page 151.

PLATE XIII





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FRASERA TUBULOSA.

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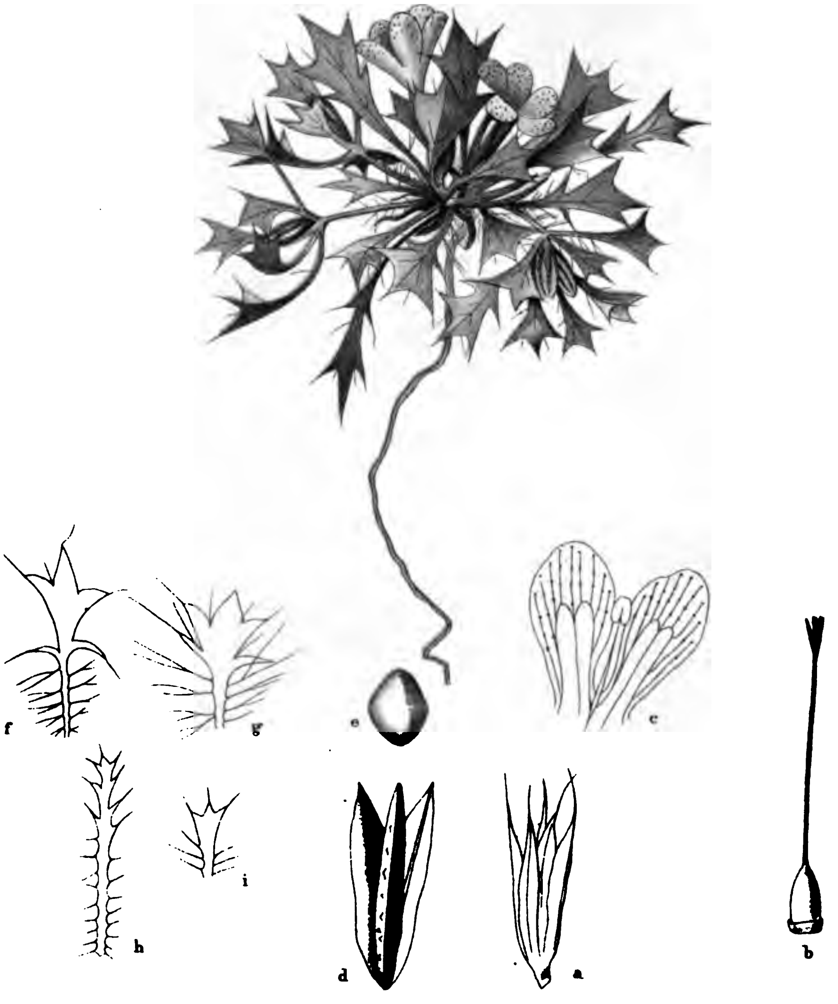
PLATE XIV.

Navarretia setosissima punctata Coville.

Fig. *a*, fruiting calyx; *b*, pistil; *c*, two corolla lobes and a stamen; *d*, capsule, one valve and the seeds removed, showing two valves and the placental axis; *e*, seed; *f* and *g*, leaves; *h* and *i*, leaves of *Navarretia matthewsii*. Figs. *a*, *b*, and *c* are enlarged 2 diameters from moist specimens; fig. *d*, 4 diameters; fig. *e*, 6 diameters; figs. *f* to *i*, 2 diameters. Description on page 154.



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NAVARRETIA SETOSISSIMA PUNCTATA.

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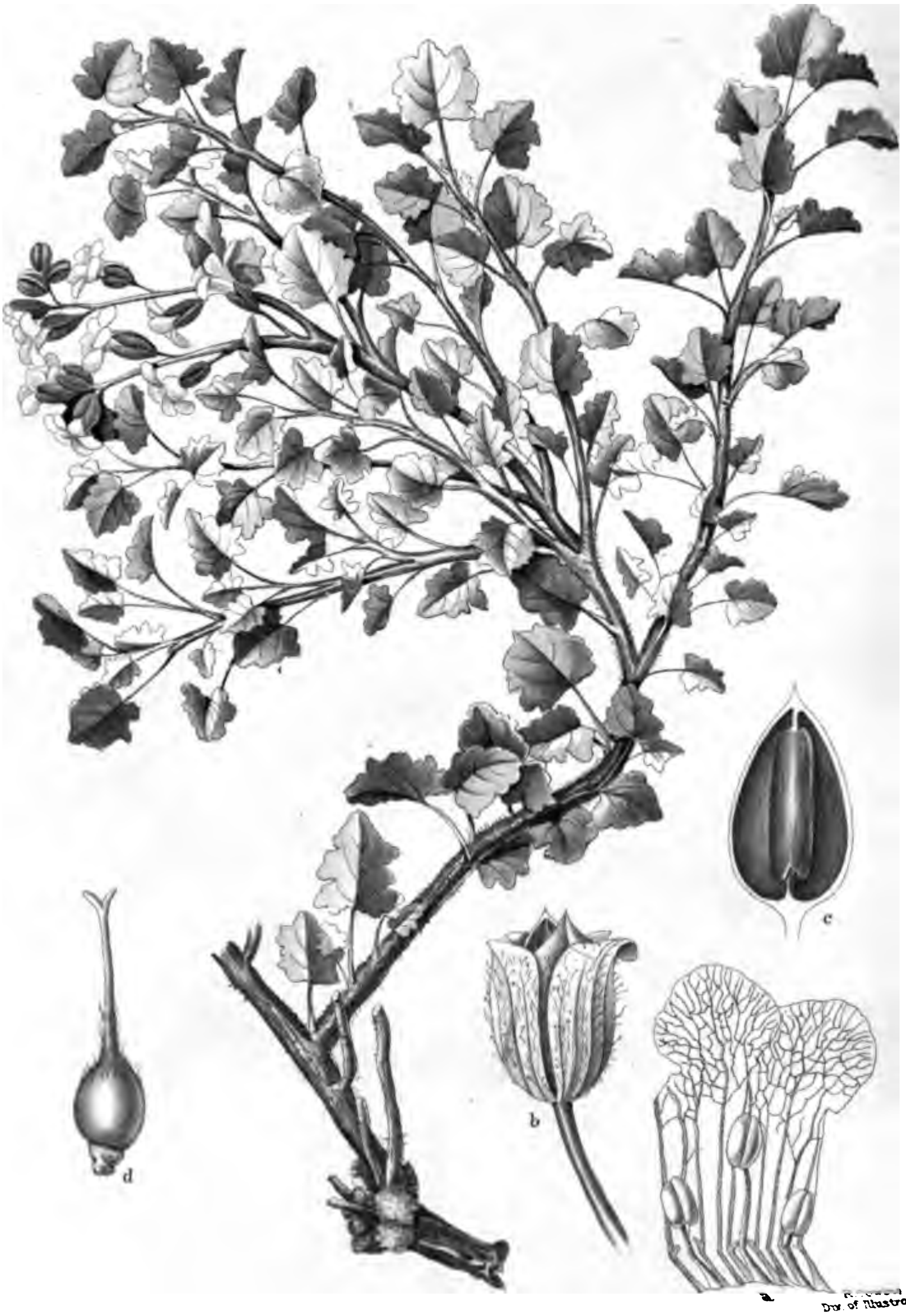
PLATE XV.

Phacelia perityloides Coville.

Fig. *a*, portion of the corolla viewed from the inside; *b*, fruiting calyx, with its pedicel and capsule; *c*, one-half of an empty capsule, viewed from the inside, showing the broad placental axis; *d*, pistil. Figs. *a* and *b* are enlarged 5 diameters; fig. *c* about 7 diameters; and fig. *d* about 8 diameters. Description on page 160.



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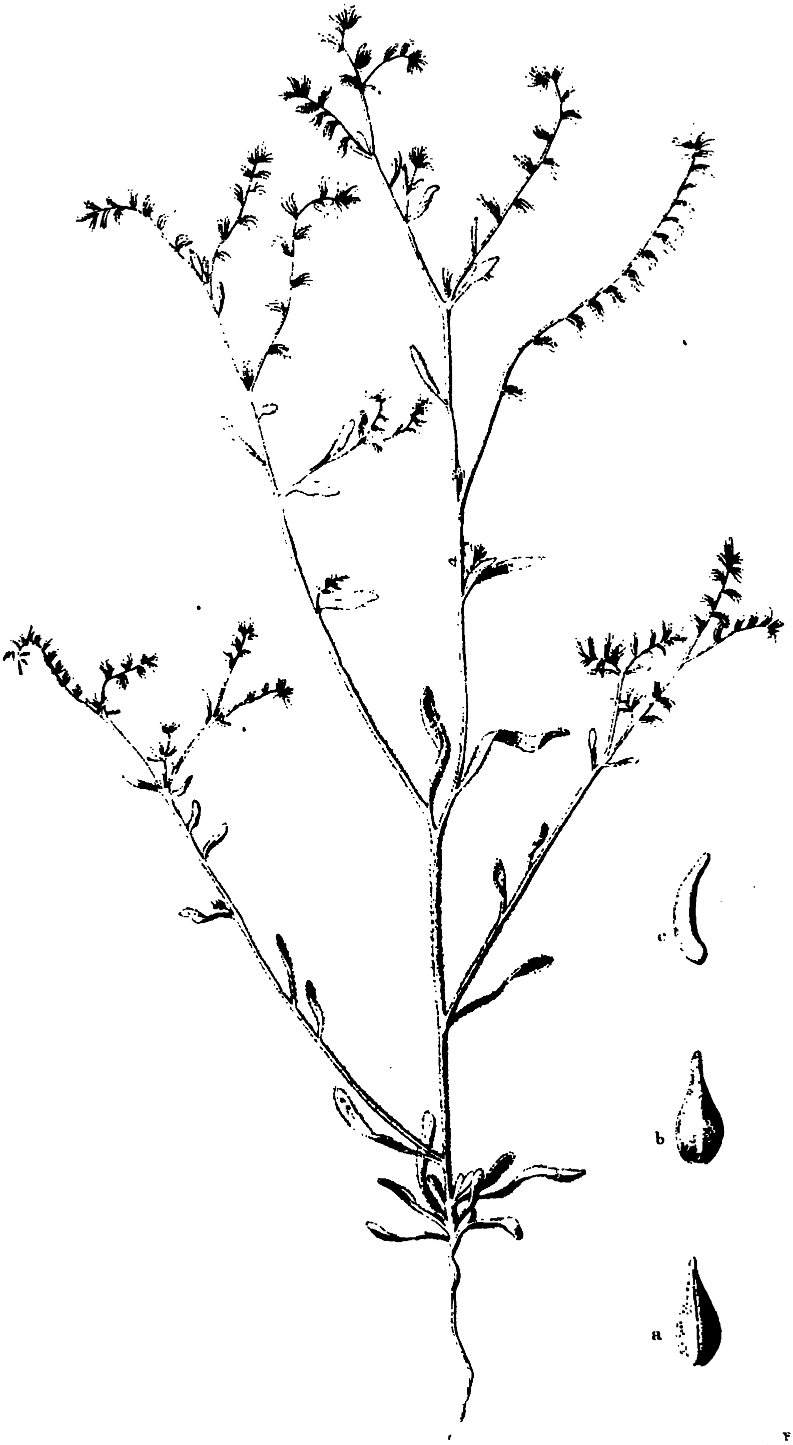
PHACELIA PERITYLOIDES.

PLATE XVI.

Cryptanthe recurvata Coville.

Figs. *a*, *b* and *c*, nutlet, viewed from the inner face, outer face, and side, respectively, enlarged 10 diameters. Description on page 165.



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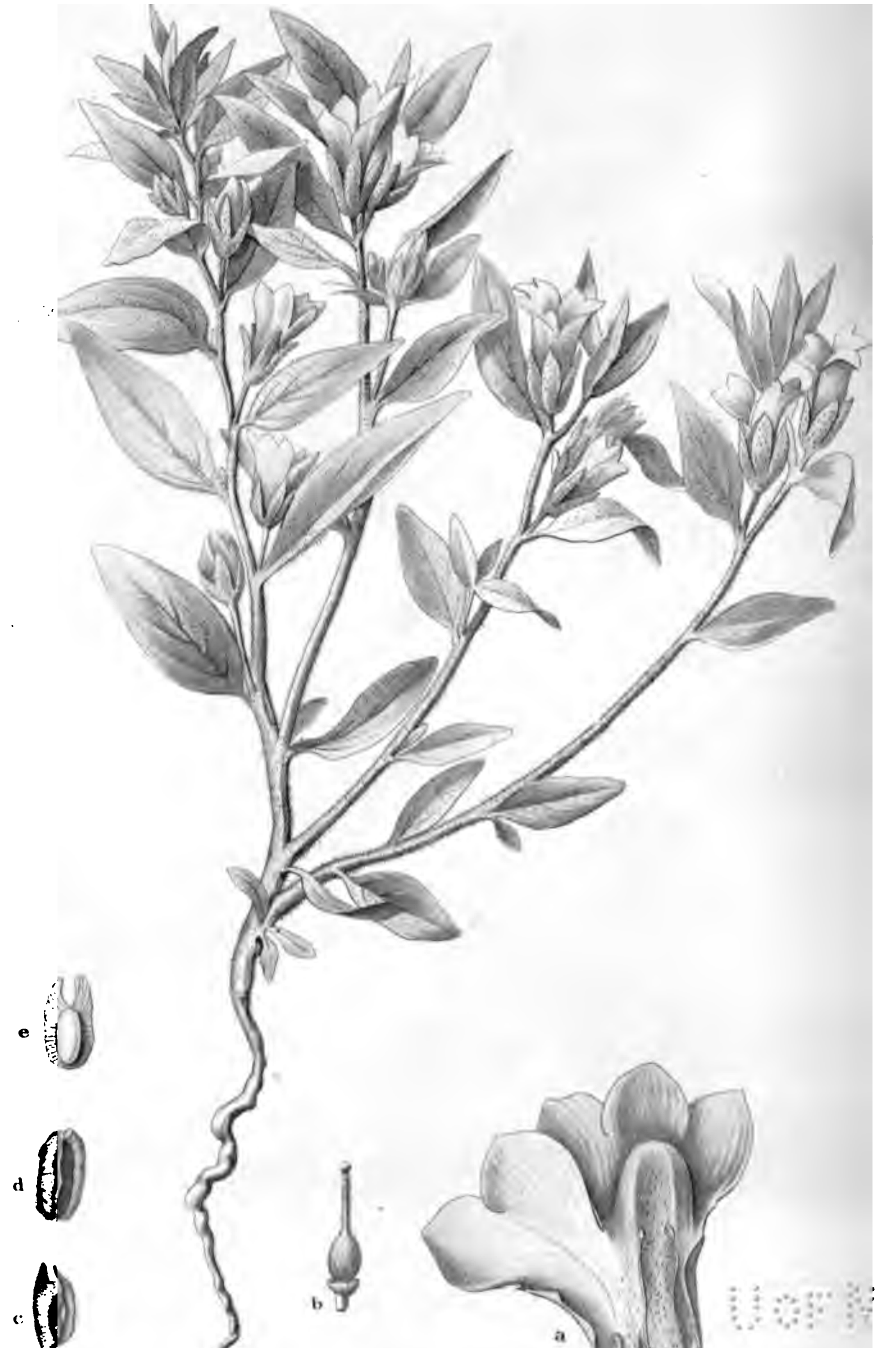
CRYPTANTHE RECURVATA.

PLATE XVII.

Mohavea breviflora Coville.

Fig. *a*, corolla, split at the side and viewed from within, showing the three-lobed lower lip with its palate, the two-lobed upper lip, two fully developed stamens, and three rudiments of stamens; *b*, pistil; *c*, *d*, and *e*, seeds viewed from different points, the wing-like margin in *d* incurved. The main figure does not sufficiently express the bilabiate character of the corolla. Figs. *a* and *b* are enlarged 2 diameters; figs, *c*, *d*, and *e*, 5 diameters. Description on page 168.



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MOHAVEA BREVIFLORA

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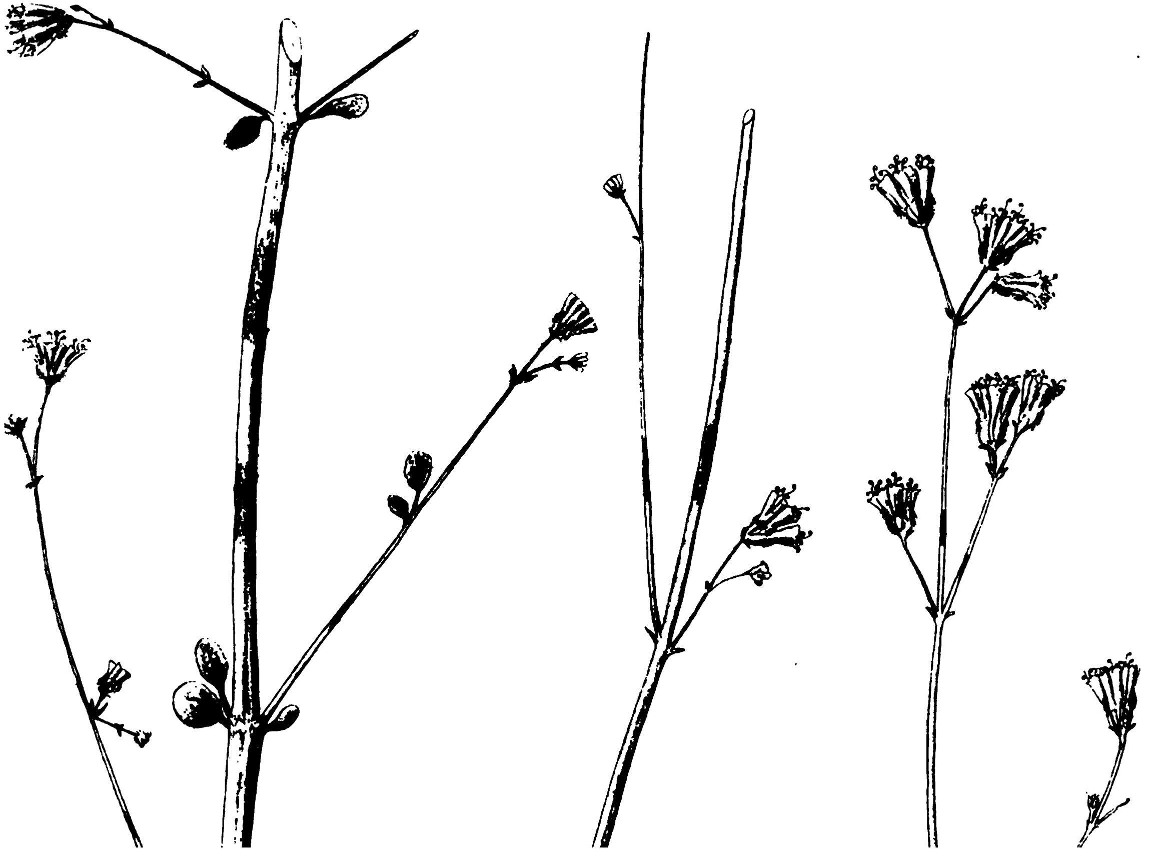
PLATE XVIII.

Bœrhavia annulata Coville.

Fig. *a*, flower; *b*, perianth, split open and viewed from the inside, showing the three stamens; *c*, pistil; *d*, fruit. All the lettered figures are enlarged 2 diameters, the main figure reduced to four-fifths its natural size. Description on page 177.

PLATE XVIII



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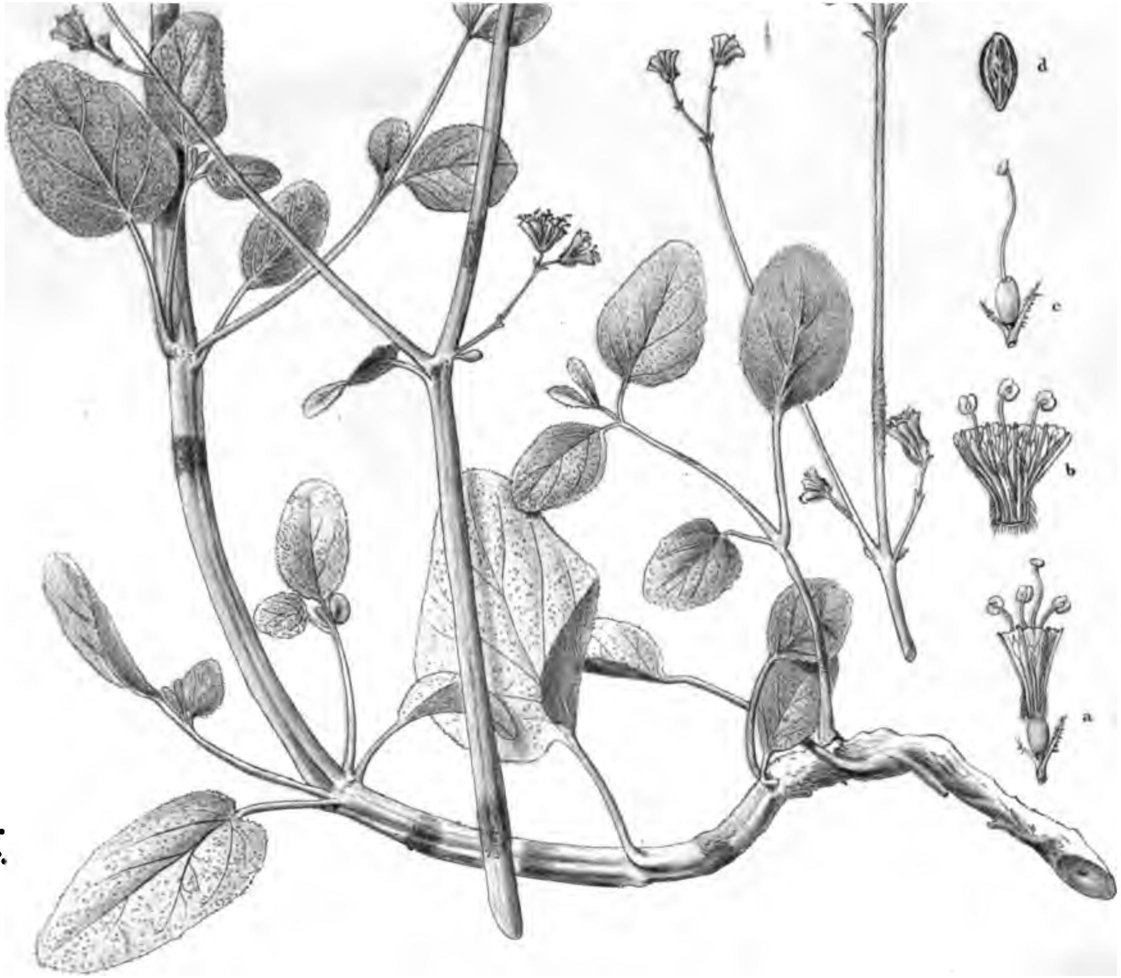

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BŒRHAVIA ANNULATA.

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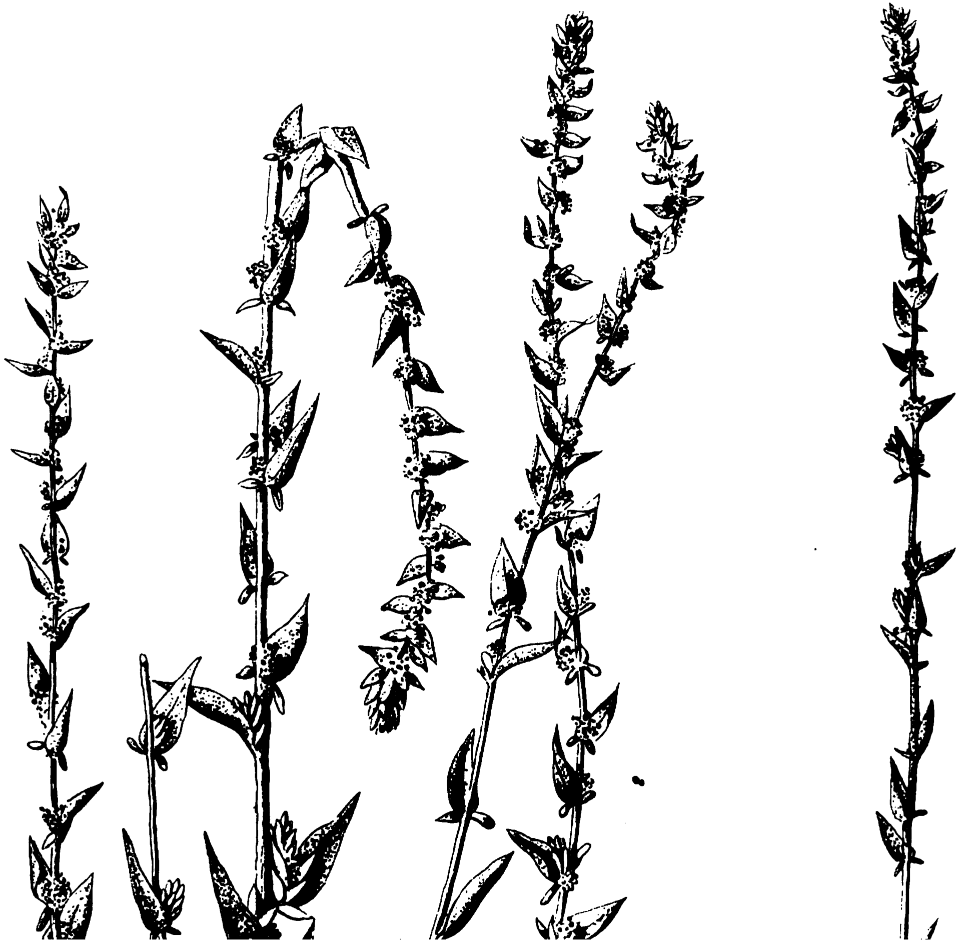
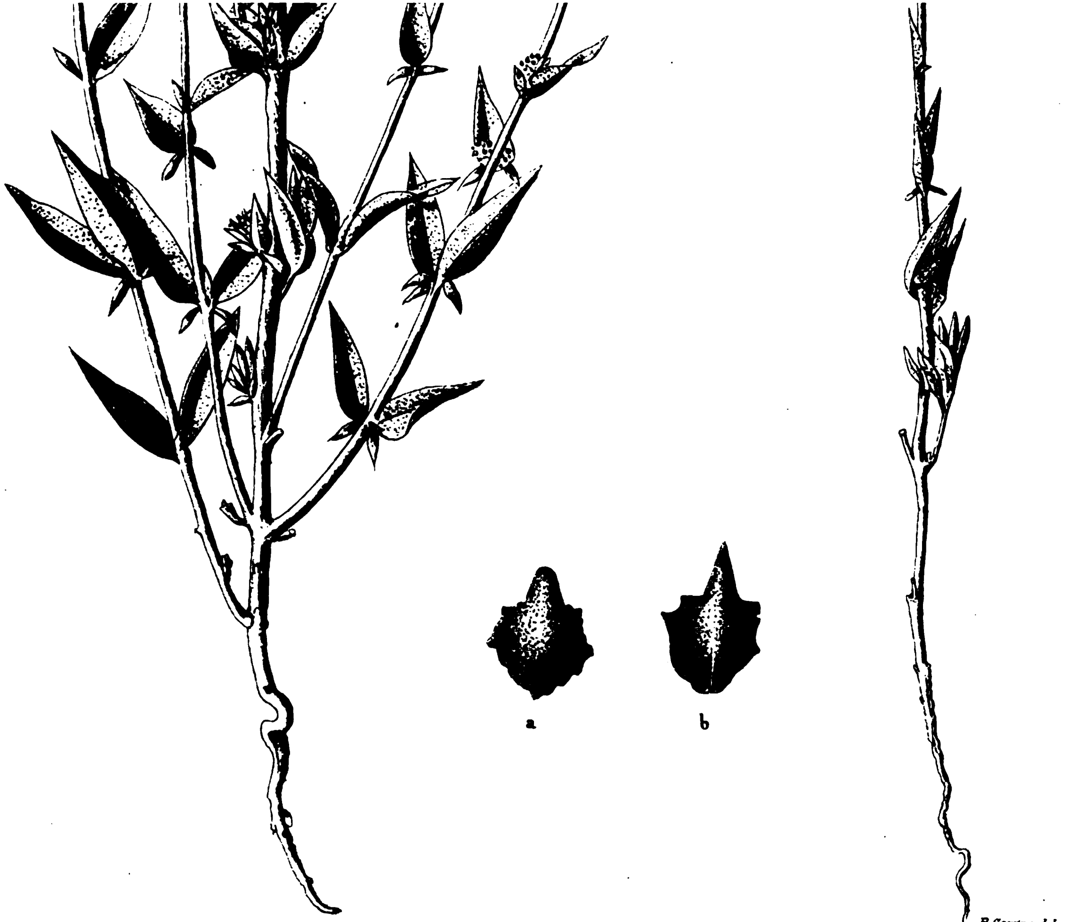
PLATE XIX.

Atriplex tularensis **Coville.**

Figs. *a* and *b*, fruiting involucres, enlarged 5 diameters. Description on page 18

PLATE XIX.





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ATRIPLEX TULARENSIS.

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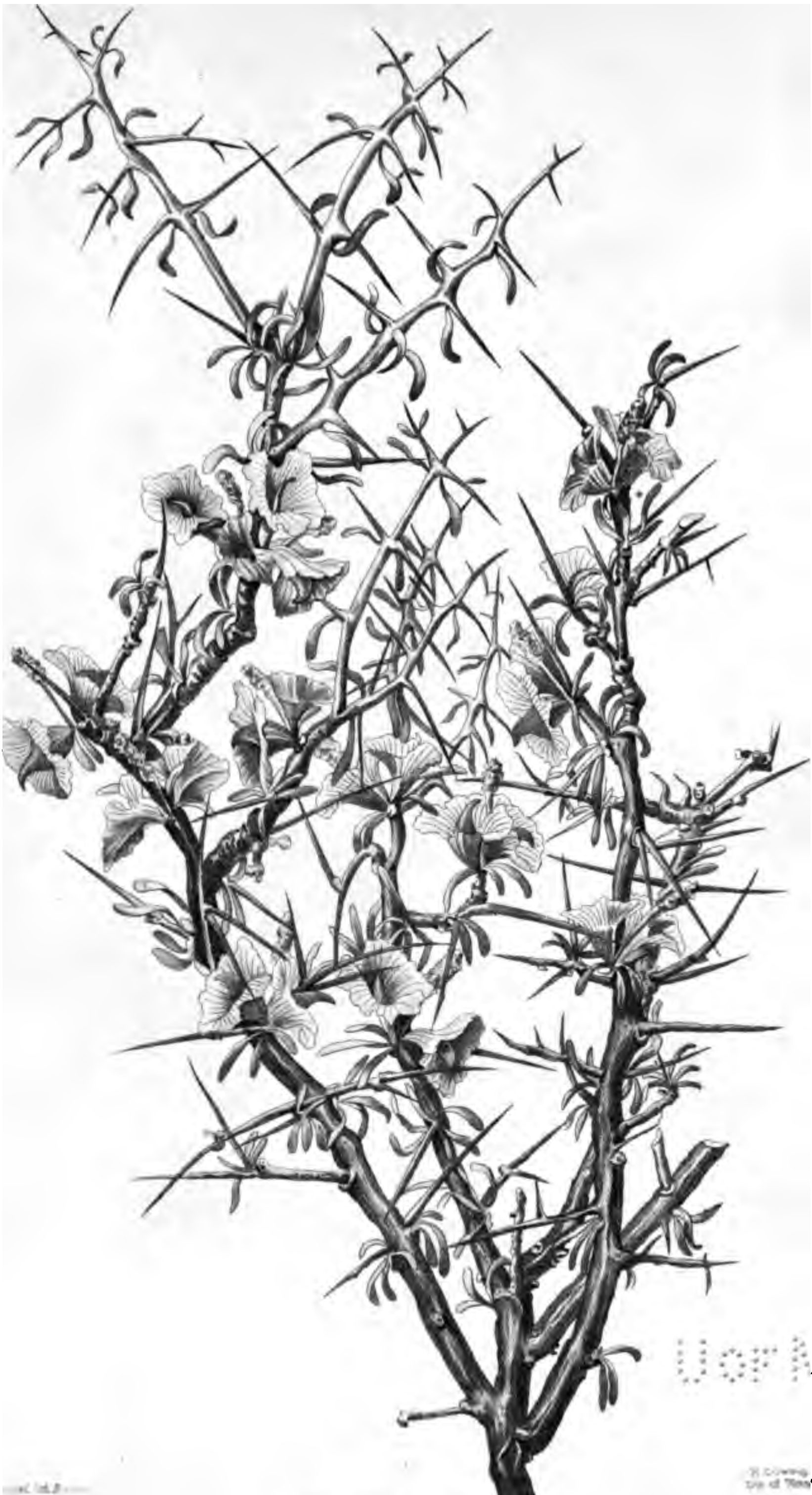
PLATE XX.

Sarcobatus baileyi **Coville.**

Description on page 184.



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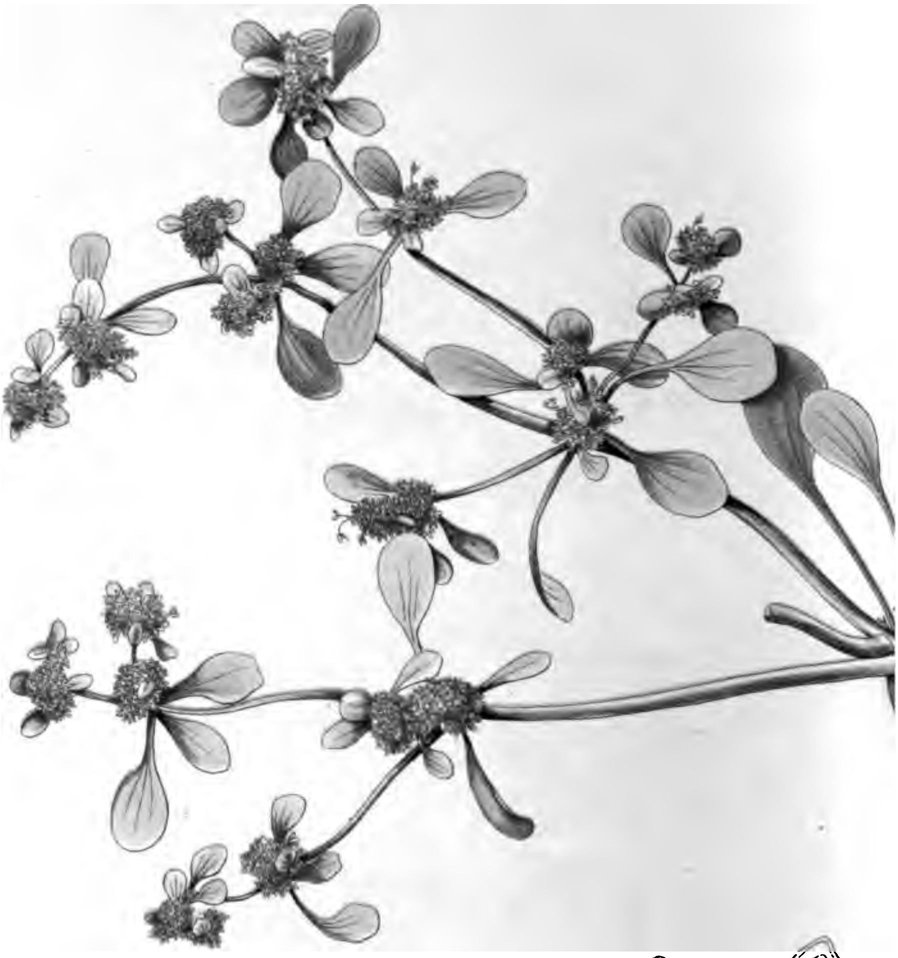
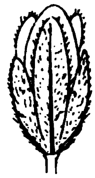
SARCOBATUS BAILEYI.

PLATE XXI.

Phyllogonum luteolum Coville.

Fig. *a*, flower and its pedicel, enlarged 5 diameters; *b*, pistil, enlarged 10
ters; *c*, fruiting perianth and nutlet, enlarged 12 diameters; *d*, vertical
of the nutlet showing the embryo, enlarged about 16 diameters. Desc
on page 190.





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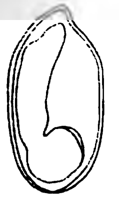

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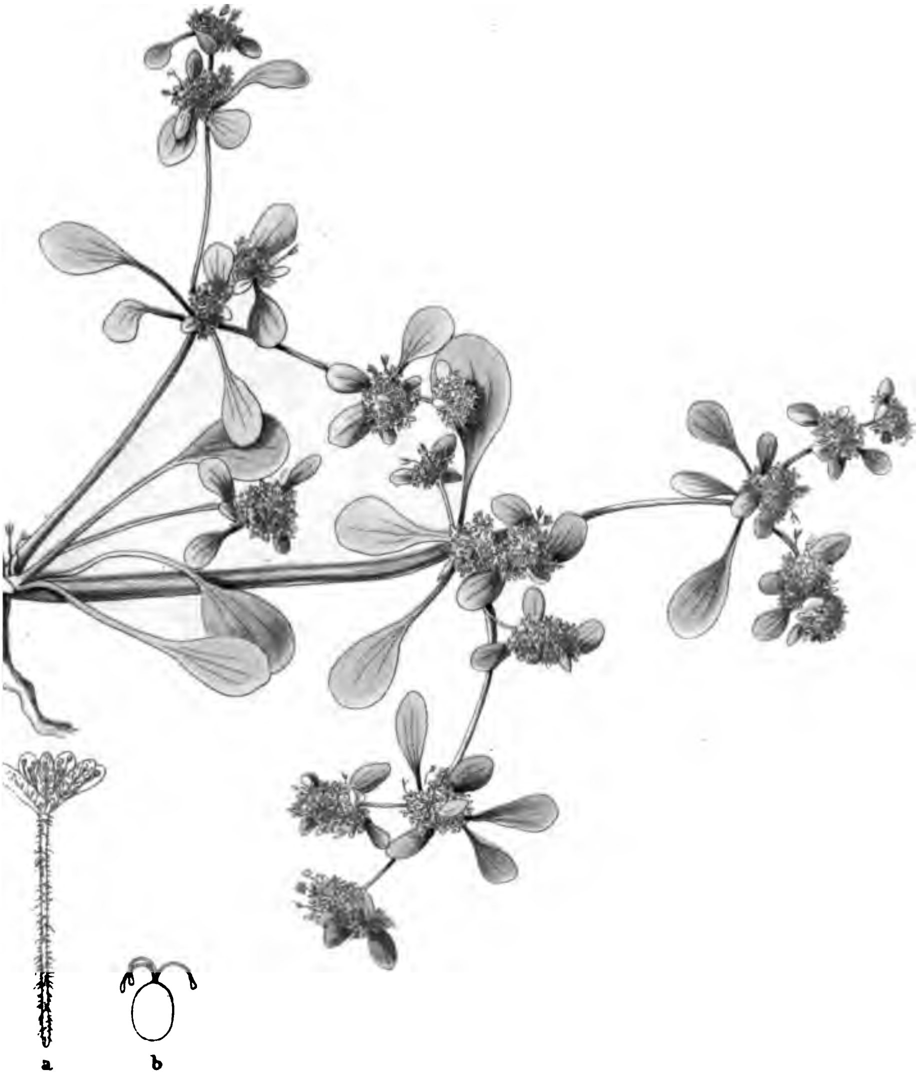
B Meisel Lith Boston

PHYLLOGON

PLATE XXI



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INDEX TO THE MAP.

This index has been prepared to aid in locating on the map the places mentioned in various parts of the report. The letters and numbers following each name indicate, by reference to the same signs on the margin of the map, the approximate position of these places. Those names which do not occur on the map are marked by an asterisk (*).

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